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Next Month....

The September issue will carry the first instalment of a two-part article by Alan D. Berg, Chief, Food Resources & Regional Development, U.S. Agency for International Development, New Delhi, on the problems posed by malnutrition.

In an informative article, Mr. C. K. Kamath, one of our Honorary Advisers, will discuss the problems of quality control in biscuit manufacture.

Among other contributions will be an article on baby foods by David Stephens, an article on atomic food preservation and a report on the forthcoming Bombay seminar on " Cost reduction in packaging. "

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Editorial

Fillip to food industries

THERE is enough evidence to show that the Government of India is now more fully alive than ever to the importance of agriculture and agro-based industries. The annual Plan-1967-68 now placed before Parliament repeatedly refers to the vital significance of increased farm output to the country's economy. This by itself is to be unreservedly welcomed. It is bound to give a fresh impetus to food processing industries. After all these industries can thrive best only in the context in which agriculture receives the utmost attention and support.

Broadly speaking, the outlay on agricultural programmes is expected to be Rs. 296 crores against Rs. 268 crores in 1966-67. Some indirect benefit is also likely to be received by agriculture through investment in industry (Rs. 520 crores against Rs. 542 crores in organised industry and Rs. 43 crores against Rs. 45 crores in village and small industries). The entire Plan, as is well-known, consists of both Central and State expenditure. In the States' sphere, agricultural programmes will claim Rs. 60 crores while the share of animal husbandry, dairying and milk supply will be some Rs. 19 crores; fisheries get a new boost with an allotment of Rs. 8.81 crores. In the Central sphere, the budget allocations for 1967-68 are Rs. 1 crore for improved seeds, Rs. 1.75 crores for plant protection, Rs. 5 crores for agricultural implements, Rs. 1 crore for animal husbandry, Rs. 91 lakhs for dairy and Rs. 8.13 crores for fisheries.

Food grain production is expected to reach 100 million tonnes in 1967-68 against some 76 million tonnes in 1966-67. The target for cotton is placed at 7 million bales against the likely achievement of 5.80 million bales in 1966-67. The target for sugarcane and oilseeds is 12 million tonnes and 9 million tonnes respectively against the likely achievement of 10.4 million tonnes and 8.0 million tonnes in 1966-67. The new targets set for this year are indeed impressive and given the necessary drive these are well within the country's reach.

A commendable feature of the Plan is that it carries the emphasis given so far to fisheries and subsidiary foods a stage further. In 1966-67, some 800 new mechanised boats were pressed into service and four harbours were taken up for development to provide the facilities these boats need. In the current year, a plan for a pre-investment survey of harbours has been finalised. As regards subsidiary foods for 1967-68, the programme envisages an increase of 1.500 mechanised boats for fishing. In regard to inland fisheries, the Plan provides for reclaiming uncultivated waters and for setting up fish seed farms. In respect of dairying and subsidiary foods, stress is being laid on the consolidation and completion of existing schemes.

It is by now well-known that several States, including Gujarat and Maharashtra, have set up agro-industries corporations and this trend is bound to gain a momentum in the current year. These corporations could become pace setters for the progress of food processing industries in that they could help them directly and by providing the necessary inputs for agricultural production help them indirectly.

The new awareness of the importance of fortified foods is a welcome development and it may be expected to help food processing industries, particularly those manufacturing protein foods. The stage is thus set for some modest fillip to food processing industries.

BANGALORE WORKSHOP ON BRIDGING PROTEIN GAP

By A Special Correspondent

THE urgent need to bridge the protein gap in countries like India was brought into sharp focus early in July at two conferences, one on the production and the other on the marketing of low-cost protein foods.

The first one was held at Mysore and took the form of an eight-day International Symposium on Protein Foods and Concentrates.

The symposium at Mysore was followed by a three-day workshop (July 5 to 7) on "New Food for National Development". This was at Bangalore and took up from where the Mysore symposium left off.

The workshop was jointly sponsored by the Food Corporation of India, the Indian Society of Advertisers, the Indian Institute of Management, Ahmedabad, the All-India Management Association and the U.S. Agency for International Development.

UNIQUE MEETING

The workshop was a unique meeting of technologists, research workers, Government specialists, senior representatives of food manufacturers in the private and co-operative sectors, international protein food scientists and food consultants. Over 60 Indian members and experts from abroad took part in the deliberations.

The Indian participants included those specially concerned with developing, producing and marketing new high-protein foods inexpensive enough to reach the mass markets where they are most needed. Some of these experts were: Dr. H. A. B. Parpia, Director of the Central Food Technological Research Institute (CFTRI), Mysore; Dr. Kalyan Bagchi, Nutrition Adviser to the Union Ministry of Health; Dr. V. Kurien, Chairman of the National Dairy Development Board and General Manager of the Kaira District Co-operative Milk Union (Amul Dairies), Gujarat; Mr. R. Ramaswami, Vice-Chairman of Hindustan Lever, and Mr. R. V. Leyden, General Marketing Manager, Voltas Limited.

The three participating American experts were: Dr. Aaron Altschul, special assistant to the U.S. Secretary of Agriculture, Mr. Orville Freeman, and Chairman of the U.S. Government's Inter-Agency Committee to combat malnutrition; Dr. Sidney M. Cantor, one of America's leading food technologists and marketing consultants; and Dr. Nevin Scrimshaw, nutrition scientist from the Massachusetts Institute of Technology.

In his presidential address, Mr. K. T. Chandy, Chairman of the Food Corporation of India (FCI), outlined the problem of portein deficiency and its special implications to pre-school children.

Noting that protein is essential to mental and physical growth, Mr. Chandy said that children in the age group 0-5 suffer irreversible loss, if they do not have an adequate intake of protein.

FOOD INDUSTRY'S ROLE

Mr. Chandy pointed out that Indian scientists have played a very significant world role in this field. He referred to their work on the utilisation of vegetable protein from groundnut and cottonseed. The task of narrowing the considerable protein gap in the children's diet in India, added Mr. Chandy, cannot be left to the Government alone; the food industry has an equal responsibility.

The first day of the workshop was devoted to a discussion of the problem of protein malnutrition and its effects on the human system.

Dr. Scrimshaw talked of studies in many parts of the world, pin-pointed the dangers and suggested some directions in which solutions might be found.

Last October he had made several proposals to apply new genetic techniques for saving and increasing the protein value of important crops, mainly oilseeds and cereals. His proposals also referred to the production and use of fish protein concentrates and the manufacture of synthetic amino-acids to raise the protein content of natural food. He gave details of 'FPC' (Fish Protein Concentrate), a new American product that is expected to play a key role in the forthcoming global war on malnutrition. It is claimed that FPC, which is odourless and palatable, can be made and sold at 10 paise per adult per day. One pound of FPC is said to be comparable in protein value to five lb. of good quality meat.

Mr. Sydney Cantor talked at some length of the way in which the right market information and marketing techniques can quicken the pace of solving the problem. Marketing, he said, meant providing the right link between resources and means.

The Indian participants described the efforts being made in the country to produce inexpensive foods. Dr. Parpia described some recent formulations evolved by the CFTRI and other research organisations. These formulations were available for use in commercial production.

CALL FOR QUICK ACTION

Dr. Altschul spoke at dinner on the second day. He regretted the laggard pace of progress towards closing the protein gap. He made a moving plea for immediate action and urged that targets be set. This, he

believed, was not just a first step but also a way of ensuring some action.

Hindustan Lever and Amul gave an account of how new food products might be developed and marketed. The case histories they used were packet soups (HLL) and Baby Food (Amul). The moral of both presentations was clear: market information, research, production and advertising had to be a closely integrated operation, if marketing was to be successful.

The participants in these presentations were: for Hindustan Lever, Dr. S. Varadarajan, Research Director; Dr. N. C. B. Nath, Marketing Controller (Foods), and Dr. V. N. Patankar, Head of Management Services Group; for Amul, Dr. V. Kurien and Mr. R. V. Leyden.

Both sessions were outstanding examples of the presentation technique and sophisticated marketing thinking. The Hindustan Lever soups were India's first 'soups in a package'; Amul Baby Food was made in the teeth of a widespread belief that buffalo milk was unsuitable for the intended objective. Both operations were, therefore, bedevilled by many difficulties and involved basic decisions that could not be founded on much previous experience.

PROTEIN-RICH TOFFEE

On behalf of the Indian Society of Advertisers, Dr. Nath and Mr. Gerson da Cunha, Deputy Manager, Lintas, demonstrated the logic of how a protein food might be conceived, marketed and advertised. Starting from an analysis of the problem, they showed how the right product might be selected from a variety of alternatives and then presented in human, dramatic terms to its intended market. For the purpose of the exercise a kind of toffee fortified with protein was used.

Dr. Altschul was so much impressed with the demonstration that he was heard to remark: "What I have seen just now is alone worth my visit to India." He also took with him a few specimens of the toffee (incidentally, they were not specimens of a finished product but prepared just for the purpose of demonstration). He wanted to convince Mr. Orville Freeman, U. S. Secretary of Agriculture, about the feasibility of projects like these and to tell him about certain marketing companies in India who had the necessary competence and imagination to implement a project of the type which formed the subject of presentation.

The communications aspect of the problems was also thoroughly gone into. The necessity to raise the level of awareness of protein malnutrition and its effects, and the promotion of a specific brand raised several problems that needed thought and money. It was suggested that a Government subsidy in one form or the other was necessary, if the food inlustry in the private sector was to market such products successfully.

RECOMMENDATIONS

The workshop then broke up into five syndicates. Each syndicate studied a specific aspect of bridging the protein gap in India—the kind of market information necessary; the nature of Government assistance; the ways in which the right climate might be created in India for protein foods; the organisational and financial implications.

The recommendations of the syndicates included:

1. Collection of basic research information both in rural and urban areas on the use and availability of staple foods for the purpose of enrichment and on the availability of raw materials for the manufacture of protein foods.
2. A national organisation for the food industry to aid the planning and implementation of new production programmes.
3. A review of regulations in order to eliminate restrictions and obstacles in the way of developing protein foods.
4. Close liaison between industry and research: multi-disciplinary industrial research, consultancy and extension service in the national laboratories
5. Creation of an awareness of protein needs through national campaigns.
6. Flexibility in Government policies in regard to protein food production.
7. Publication of official specification and standards of identity for edible groundnut flour, cottonseed flour and sesame flour prepared by solvent extraction or other programmes.
8. More adequate representation for the food industry on the Central Committee for Food Standards.
9. Highest priority for the food industry to enable it to secure materials essential for the manufacture of protein foods and relaxation of restrictions on the movement of essential materials which inhibit the growth of the food industry.
10. Tax exemptions and fiscal incentives to encourage the upgrading of inedible oil-cake and low-grade sources of protein to permit their utilisation in foods for human consumption.

An important outcome of syndicate work was the proposal, accepted with acclamation, to carry the spirit and decisions of the workshop forward through the setting up of a permanent body to explore the possibilities of producing protein-rich products in the country. To this end, a ten-member and hoc committee, headed by Mr. R. Ramaswami, was constituted. The committee will make preliminary recommendations by the end of September.

HIGH-PROTEIN WEANING FOOD

The three-day workshop concluded on an optimistic note. Dr. Kurien announced plans to build India's first high-protein weaning-food plant utilising soyabeans. The new product, he said, will be formulated and tested in collaboration with the CFTRI, Mysore.

The full significance of the symposium and the workshop becomes apparent if it is remembered that more than half of the 63 million babies likely to be born this year are doomed to malnutrition in their first three years and that nearly 80 per cent. of India's population is afflicted with the symptoms of protein deficiency.

The success that has attended the efforts to change the dreadful picture of protein deficiency in Hong Kong and Japan has an all important lesson for us in India.

EDIBLE OIL FROM COTTONSEED

By YETCHANNA

IN the context of the apparently insurmountable problem of population explosion, there is need for correcting the prevailing food imbalance, featured by the lack of protein, particularly in the diets of the poor.

Inasmuch as India has been experiencing perennial food shortages, for one reason or the other, in the past few years, leading to increased dependence on P. L. 480 doles, there is need for this country not only to undertake intensive methods of cultivation through scientific utilisation of fertilisers and pesticides but also to ensure that there is a rational usage of the available food resources, taking care to maintain a healthy balance in the intake of calories, proteins and fats.

Latterly, there has been an increasing awareness among the world's top nutritionists that babies and adults thrive on properly balanced vegetable protein alone and that there is no need for any undue dependence on animal protein.

POOR CONSUMPTION

In the light of the foregoing, an attempt is made here to pinpoint the need for husbanding India's scarce vegetable protein food resources, with specific reference to the use of cottonseed and its by-products. While India is no doubt a major producer of oilseeds and vegetable oils, the per capita consumption of oils continues to be deplorably low and as such any product that could contribute materially to filling this nutritional gap should be welcome.

Until 1960, when a few pioneering entrepreneurs formed an association, namely the All-India Cottonseed Crushers' Association (AICOSCA), cottonseed was considered to be a waste product and was directly fed to cattle. However, with the formation of the Association, the crushing of cottonseed was undertaken with a view to ensuring a more profitable use of the cottonseed available in the country.

India has the largest acreage under cotton in the world and, within the limitations set by the low yield per acre, this country has a substantial base for supplying cottonseed in sufficient enough quantities to provide the requisite raw material for the crushing industry.

ECONOMICS OF COTTONSEED

India has the resources to produce over 200,000 tonnes of cottonseed edible oil annually, which can meet about 50 per cent. of the total needs of the indigenous vanaspati industry, according to Mr. N. J. Agrawal, who submitted a paper on the economics of cottonseed and its by-products at the seminar of the Oil Technologists' Association, held in Bombay early this year.

Inasmuch as the deshi varieties of cottonseed, used for raising short staple cotton, contained, by and large, less oil and less protein, it has been found that it is more economical to crush the fuzzy types of seed from medium and longer staple varieties like Buri American, CO2, Laxmi and ISC 67.

In fact, on account of the difficulties encountered in decorticating and separating the hulls from the meals, when deshi varieties of cottonseed are used, all the decorticated cake is produced from the fuzzy types which, in addition, have a higher protein content.

While India's major oilseeds resources such as groundnut, rape and mustard, sesamum, linseed and castorseed have been fairly fully tapped, cottonseed still remains relatively unexploited, especially so in the context of the pace of progress made by the advanced countries in the production of cottonseed cakes and extractions which go into the manufacture of cattlefeed compounds.

In India, the development of the cottonseed industry has been lagging behind mainly because there is a widespread misconception among the farmers that cottonseed, in its original form, provides a wholesome food for cattle. This practice of feeding cattle with cottonseed is at once expensive and unscientific. Cottonseed cakes are not only cheaper than the original seeds but also serve as a more wholesome cattlefeed.

PROMOTION CAMPAIGN

By making more use of cottonseed instead of cottonseed cake, the farmer deprives the crushing industry of its raw material supplies, making it uneconomic for the units to work.

The Association is fully convinced, as evidenced by its current publicity campaign, that there is need to undertake a vigorous promotion drive by which the farmers could be educated in the proper and scientific use of cottonseed cakes. Through such a method, it is quite possible to conserve sufficient supplies of cottonseed to enable the crushers to work more economically.

The crushing units, it must be pointed out here, at present export decorticated cottonseed cakes and extractions and earn for the country the much-need-

ed foreign exchange, as can be seen from the following table:–

After devaluation, the crushing industry had to suffer considerable losses on the export front until

Comparative statement showing the exports of decorticated cottonseed cake/extractions made by the members of AICOSCA

(in tonnes)

	1965			1966		1967		
	Expeller/Extraction		Total	Expeller /Extractions	Total	Expeller/Extraction		Total
January	4718.563	2750.015	7468.578	7316.000	3652.000	10968.000	5623.000	5013.000	10636.000
February	9326.103	3124.429	12450.532	9491.000	6857.000	16348.000	1920.000	9111.000	11031.000
March	6826.152	3282.333	10108.485	9571.000	4468.000	14039.000	4826.000	6004.000	10830.000
April	2504.009	1174.979	3678.988	5941.000	6712.000	12653.000	1328.000	13423.000	14751.000
May	6557.666	1116.870	7674.536	6445.000	7264.000	13709.000	100.000	14103.387	14203.387
June	5881.579	1619.015	7500.594	4702.000	5224.000	9926.000			
July	5143.319	3167.540	8311.459	6722.000	6570.000	13292.000			
August	5964.288	4086.529	10050.816	5022.000	6730.000	11752.000			
September	7789.353	3878.704	11668.057	2976.000	6453.000	9429.000			
October	5128.377	4239.559	9367.936	3384.000	2619.000	6003.000			
November	5590.310	2361.221	7951.531	1536.000	3088.000	4624.000			
December	7190.000	4498.000	11688.000	3628.000	2989.000	6617.000			
Total	72620.319	35299.193	107919.512	66734.000	62626.000	129360.000			

It will be seen from the table that the aggregate export of decorticated cottonseed cake/extractions has shown a steady improvement as between 1965 and 1966 and has been maintaining, more or less, the same trend during the current year. While this is good as far as it goes, it should be noted that India, which is the fourth largest producer of cottonseeds in the world, has yet to make considerable headway in the utilisation of cottonseed for purpose of extracting oil.

LOW CRUSHING PERCENTAGE

It has been computed that the rate of crushing of cottonseed in America is as much as 90 per cent. of the production while in India it had been less than 5 per cent. for a long period, before it moved up to 20 per cent. very recently.

India's low crushing percentage, as has already been pointed out, has been mainly due to the practice of feeding whole cottonseed to the cattle. It may be noted here that the National Council of Applied Economic Research had made the following observations on this particular point: "The cottonseed sector offers considerable scope for increasing the supply of vegetable oils in India. How large a contribution this sector makes to oil supplies will depend exactly on how much seed can be diverted from cattlefeed to oil crushing....by making oil crushing more profitable than it is now."

When the crushing of oil was made more profitable with the introduction of an export incentive scheme, the crushing percentage naturally improved from around 5 per cent. in 1955-56 to 20 per cent. within ten years. The incentives were given under an import entitlement scheme which linked the import of copra and palm oil to the export of decorticated cottonseed cake. This scheme, however, was abolished with the devaluation of the rupee.

a new export subsidy was announced from January this year. Unlike in the case of other industries, the subsidy, when announced, was not made applicable with retrospective effect, thereby in effect hampering export promotion. The subsidy is to be given only up to the end of this year, according to the original notification. But on account of the obvious need for an extension of the subsidy for a longer period until at any rate a fairly good market for the cakes and extraction is established within the country, the AICOSCA has urged the Government to consider its plea for the continuance of the subsidy.

It is needless to say that the production of more cakes will lead to the production of more oils, which should be particularly welcomed in view of the acute shortage of vegetable oils that manifests itself in this country from time to time, leading to the inevitable consequence of sky-rocketing prices.

As has been pointed out by Mr. Agrawal, cottonseed oil is richer in vitamins A & B than groundnut oil. In fact, the vanaspati industry has been latterly making more and more use of cottonseed oil although, at one time, it had shunned its use on account of the difficulties encountered in removing the yellowish colour. Obviously, the vanaspati units have subsequently realised that after thorough washing, cleaning and refining, cottonseed oil lends itself to being used as a good medium for the production of hydrogenated oils.

VARIETY OF USES

In the West, cottonseed oil has already become popular and is being used for a variety of purposes in the preparation of margarine, salad oil and hydrogenated oil. Apart from all these factors, the very fact that cottonseed oil has a high potential to alleviate the shortage of groundnut oil in the country

(Continued on next page)

PROTEIN FOODS ASSOCIATION

A new body to be called "Protein Foods Association" or "Profoods Association" is proposed to be formed to give a fillip to research, development and production of improved foods to raise the nation's nutritional standards.

Membership of the association is to be confined to food manufacturers and institutes of food technology, according to a decision taken by a ten-member ad hoc committee which met in Bombay in the last week of July. An initial membership of 50 to 60 major food manufacturers is expected.

The main objective of the proposed association is "to promote the development of an improved national diet with special emphasis on the development, packaging and marketing of protein foods."

It proposes to achieve this through co-ordination among industries, institutions of food science and technology and the Government. New processes and product development are proposed to be stimulated by bringing together those interested in the use of proteins with those having access to raw materials, know-how and capital.

The accent will be on research and development on the one hand, and promotion of protein foods through adequate propaganda with the aim of raising the nation's nutritional standards, on the other.

Information on foods, markets and habits, both in urban and rural areas, will be collected and the availability of raw materials will be investigated by means of surveys and research. This will help in development of suitable foods and planning their production.

A vigorous national campaign is proposed to foster and promote the consumption of protein foods by creating an awreness of the value of protein.

The sponsors hope to achieve their aims after about five years, on the basis of an initial budget of Rs. 2.5 lakhs a year.

Proteins are very much in the news, thanks to the international symposium on the subject held at CFTRI in Mysore, in June. This was followed by a workshop in Bangalore, early in July, on New Food for National Development. The ad hoc committee was an outcome of the Bangalore deliberations.

The Committee met in Bombay in the last week of July under the chairmanship of Mr. R. Ramaswami. The other members: Mr. Kanak Nanavathy, Mr. T.S. Nagarajan, Mr. B. B. Sardeshpande, Mr. A. V. Modi, Mr. N. S. Pochkhanawala, Mr. N.K. Vissanji, Mr. T M Rama Iyengar, Prof. Michael Halse and Mr. C. D. Menon.

Another meeting is to be held in September when concrete steps are expected to be taken to bring the association into being.

(*Continued from previous page*)

should open the eyes of the Government to the need for encouraging the crushing industry.

It has been projected that India will have a cotton yield of 76 lakh bales by the end of the Fourth Plan when about 25 lakh tons of cottonseed would become available which could give approximately 2 lakh tons of excellent quality edible cooking oils besides cakes and extractions. As the extraction of oil from cottonseed is on the low side, there is need for the creation of good markets for cottonseed cakes and extractions through the establishment of more and more units exclusively devoted to the manufacture of cattlefeed compounds.

A good beginning has been made in this direction and the authorities should extend all possible assistance to see that there is greater production of cattlefeed compounds in the country, and what is more important, a fuller use of the compounds by the farmers.

USEFUL BY-PRODUCTS

Besides cottonseed oil and oilcakes/extractions, the other by-products of cottonseed are linters, hulls and soapstocks. The linters are used as a raw material for the paper industry, for the manufacture of nitrocellulose and for rayon grade pulp. Hulls are good as cattlefeed, inasmuch as they contain 2 per cent. oil and are just sufficient for the requirements of the cattle. However, due to its low protein content hulls could be used only for dilution of high-protein food and as roughage but not as a substitute cattlefeed.

Soapstocks can be used for making acid oil and as a raw material for the manufacture of soaps. A major portion of cottonseed soapstocks is now being used for making brown-coloured cheap soaps, which are very popular among the poor.

It is also to be noted that there is a great future for the development of protein manufacture from cottonseed for human consumption. They have distinct advantages over groundnut proteins. Cottonseed oil is invariably recommended for heart patients and those suffering from diabetes.

A country which is poor in food resources should take full advantage of the scope provided by cottonseed in supplying some of the valuable proteins and fats needed for the nation's healthy development.

JAM & PICKLE MANUFACTURING PROCESSES IN BRITAIN

By ANTHONY WOOLLEN

IN Britain the term "preserves" covers edible products which depend for their keeping properties solely on their composition. These include jams, marmalade, jelly jams, lemon curd and candied fruits in which the preserving ingredient is sugar; pickles and sauces in which it is acetic acid (vinegar); and mincemeat and certain other sauces and condiments in which it is a mixture of the two.

Fruits used in the manufacture of British jams include strawberry (by far the most popular), raspberry, blackcurrant, redcurrant, apple, gooseberry, plum, damson, greengage, blackberry, cherry, apricot and pineapple. Jam is also made on a small scale from quinces, figs, marrow and ginger, and ginger alone.

Most British jam is made from home-grown fruit, but some strawberry, blackcurrant, raspberry and apple jam is made from imported Dutch fruit, and apricot and pineapple jam entirely from imported canned fruit.

GOVERNMENT REGULATIONS

In Britain, Government regulations lay down that jam must contain not less than 68.5 per cent. of soluble solids (or 65 per cent. for jam in hermetically sealed containers) and specify the minimum content of each kind of fruit.

High-quality jam is often required to contain recognisable pieces of fruit, and both fruit variety and processing conditions must be carefully controlled so that the fruit particles are not tough on the one hand or completely disintegrated on the other.

Jams are essentially products with a definite "set", imparted by the pectin content of the fruit. Pectin occurs naturally in plant tissues and is the binding agent between the cell walls. Lemons, bitter oranges, apples, quinces, gooseberries, blackcurrants, redcurrants and plums are rich in pectin, and jams made from them do not need the addition of further amounts; blackberries, raspberries, strawberries and cherries contain less pectin and in the making of jam from these fruits pectin must be added.

In Britain, pectin extracts for this purpose are usually prepared from apples by heating apple pulp in an autoclave, or by boiling it with citric or tartaric acid and pressing out the liquid. The resultant juice is decolourised with enzymes and with carbon, clarified by filtration and concentrated by a vacuum process.

A HARMLESS FLUID

The result is a harmless, viscous fluid containing about three per cent. pectin, which does not affect the colour or flavour of the jam. Alternatively, pectin powder may be produced by precipitation from the liquid extract and subsequently drying and grinding.

In modern jam-making practice the tendency is to use more pectin than formerly to enable a product with satisfactory set to be produced with the minimum of boiling, in contrast with older methods which involved protracted boiling to the detriment of flavour and colour.

The selected fruit, after being graded, has the stems and stalks removed by machine, except strawberries, which are too soft for mechanical handling and which must be decalyxed by hand. Washing is the next essential step.

Some fruits are precooked, notably blackcurrants, gooseberries, and some plums and damsons. The precooking of blackcurrants to rupture the skins is most important. Otherwise, when the blackcurrants are boiled in a highly concentrated sugar solution, water passes osmotically outwards through the skin, and the result is hard, tough, shrivelled blackcurrants tending to collect at the jam surface.

A NEW TREND

Some plums and damsons are precooked and then sieved to remove the stones. A recent trend is to preserve plums and damsons uncooked and to remove the stones by machine.

Juices for jelly jams are prepared by cooking the fruit with water in an autoclave and then filtering.

Most jam in Britain is made by delivering prepared fruit, sugar syrup and liquid pectin by pipelines to a charging cabinet where predetermined quantities are automatically weighed, mixed and discharged to one of a series of steamheated boiling pans in which the mixture is boiled at about 225 degrees Fahrenheit to the correct concentration (approximately 69 per cent. solids content).

Evaporation under reduced pressure is increasingly being used, and this enables the process to be completed at a lower finishing temperature. Heat-induced chemical changes are thus minimised, although in some cases these changes contribute to the characteristic flavour of the jam, to which the consumer has now become accustomed.

NEW BRITISH PROCESS

A continuous vacuum boiling process has recently been developed by a British company (1); it involves metering the ingredients and passing the mixture through a thin-film evaporator. This process is not suitable for jams containing whole fruit or large parti-

cles, and can be used only for pureed fruit pulps and jellies.

Having been cooled to 180 degrees Fahrenheit, the optimum temperature for filling, the jam is automatically filled into jars which have been machine washed, sterilised and inspected. After being filled and capped the jars are conveyed through a machine called a Hydroseal (2) in which they are first sterilised and then progressively cooled. The jars are then dried and labelled. Alternatively the jam is filled into cans which are then sealed and sterilised.

Bakery Jams: Jams to be used as fillings for bakery products such as cakes and tarts must comply with more exacting requirements than ordinary retail jams. Jam for tart fillings will be subjected to further heating when the tarts are baked, during which its flavour and colour must not deteriorate.

A bakery jam generally has a higher solids content than a retail jam. It also often contains a higher proportion of glucose (up to 25 per cent. of the total sugar content) to minimise the tendency for the sugar to crystallise out on storage because of the higher solids content.

Marmalade: Marmalade is a preserve akin to jam but made from citrus fruits, mostly Seville and Malaga bitter oranges.

To the marmalade manufacturer, fruit is composed of three parts: peel, pith and pulp. The pulp is further subdivided into juice and tissue. Various kinds and grades of marmalade are made from varying proportions of these constituents; in jelly marmalade only juice and peel are used.

THE FIRST STEP

The first step in marmalade manufacture is grading the fruit and removing damage or undeveloped specimens. The graded fruit is then washed and the pulp removed from the peel either as whole pulp or as disintegrated pulp. In the former process the oranges are scalded in hot water and the peel then quartered in special machines, the peel being separated automatically, with a sharp knife, in four sections.

The peel and pulp then go to separate receptacles. In the latter process the washed fruit is picked up mechanically from the scalding bath and carried on a revolving drum automatically against stationary knives which halve the fruit, which is then carried to gouging machines.

The gouging machine is essentially a development of the domestic squeezer; the fruit halves are pressed against a ribbed conical projection in a rapidly rotating saucer, so that the interior is scooped out, leaving the peel clean. The pulp and juice flow to a receiving vessel.

The peel is then cut or shredded whole for ordinary marmalade; for jelly marmalade the pith is removed and the thin rind, containing the oil cells (which impart most of the flavour), is shredded separately to a fine degree. Thickness and length of cut for ordinary marmalade vary greatly according to the type of maramalade.

The cut peel is then cooked until tender, and when cooked is sieved.

The pulp is boiled with live steam and then sieved to remove pips, after which it is blended with the required amount of peel, or further treated to extract the juice.

PREPARING THE JUICE

Juice is prepared by filtering the steamed pulp through filter presses or bags. For extreme clarity in high-quality jelly marmalades absorbent substances and clarifying agents are used.

The blended material is then boiled at 225 degrees Fahrenheit to give a total soluble solids content of 70-72 per cent., the boiling process being similar to that for jam.

Some manufacturers put down pulp and peel with sugar syrup in drums or casks and store it for several months to mature; this has a darkening effect on the peel and the product has a richer appearance, with, it is claimed, an improved flavour.

Condiment Jellies: Jellies made from redcurrant and apple for use with meat and game are pectin jellies and as such are made in the same way as jelly jam, There is, however, a class of jellies, generally flavoured with mint (different from peppermint or spearmint, and frequently called "applemint") in which the jellying agent is gelatin. They are of low sugar content and the preserving agent is acetic acid or vinegar. These jellies are condiments and come into the category of sauces.

Lemon Curd : The ingredients of a good-quality lemon curd are eggs, lemon juice, sugar, glucose, margarine, citric or tartaric acid, salt, lemon oil, and water. A little colouring is necessary to provide an attractive appearance. Corn or wheat flour is sometimes added.

All ingredients are mixed to a uniform consistency and cooked with constant agitation for about 20 minutes.

Mincemeat : Mincemeat is a popular filling for tarts and pies, particularly at Christmas, It differs from all other preserves in that it must be cooked or baked (in the tart or pie) before being eaten, but is a compositional preserve in that the preserving agent is its high sugar content plus acetic acid.

JEALOUSLY GUARDED RECIPES

The composition is variable and every manufacturer has his own jealously guarded recipe, but the basic constituents are sugar, dried fruits such as sultans, currants, raisins and miscatels, orange and lemon peel, apples (cored and pealed), glucose, salt, spices, vinegar and citrus oils and flavourings. The product is not heated during manufacture but the jars and cans are sterilised after filled.

Pickles And Other Preserves : Included in the category of preserves are pickled fruits and vegetables such as silverskin onions, red cabbage, walnuts, cucumbers and gherkins; sweet pickles such as piccalilli (a mixed pickle in which acetic acid is replaced by a hot, unsweetened, highly spiced, thick sauce based on vinegar), and chutney (which contains fruits as well as vegeta-

bles); sauces such as Worcester sauce (a matured blend of soy, tamarinds, anchovies, garlic and hot spices), tomato ketchup—which by law may contain only tomato with onions, garlic and spices—walnut ketchup mushroom ketchup, the last being lightly spiced with a high salt content; and the condiment mint and game sauces already mentioned. All these rely for preservation on an acetic acid content of not less than 3.5 per cent.

Finally, mention must be made of candied peel and glace cherries, which are soaked in a sugar syrup of high concentration (70 per cent.) and which must be stored in an atmosphere of low humidity.

References to companies mentioned in the article:

(1) A. P. V. Company Ltd., Manor Royal, Crawley, Sussex, England.

(2) Robert Kellie & Son Ltd., 40 East Dock Street, Dundee, Angus, Scotland.

LEADING BRITISH PRESERVE MANUFACTURERS

W. A. Baxter & Sons Ltd., Northern Preserve Works, Fochabers, Morayshire, Scotland.

T. W. Beach & Sons Ltd., 56 Rouel Road, London S. E. 16.

British Canners Ltd., 27 Widemarsh Street, Hereford, England.

Chivers-Hartley Ltd., Aintree, Liverpool 9.

Frank Cooper Ltd., Victoria Works, 110 Botley Road, Oxford, England.

Cross and Blackwell Ltd., 20 Soho Square, London W. 1.

Escoffier Ltd., 2a Harders Road, Peckham, London S. E. 15.

Kearley and Tonge Ltd., Mitre Square, London E. C. 3.

James Keiller and Son Ltd., 20 Soho Square, London W. 1.

Kraft Foods Ltd., Moorgate Road, Kirkby, Liverpool, Lancashire, England.

Marela Ltd., Saunders Ness Road, London E. 14.

Margett's Preserves Ltd., 119 Balston Lane, London E. 8.

George Mason and Company Ltd., 265 Merton Road, Southfields, London S. W. 18.

Wm. Moorhouse and Sons Ltd., Sunglow Model Factory, Old Lane, Beeston, Leeds 11, Yorkshire, England.

William Poupart Ltd., Fernleigh House, Third Cross Road, Twickenham, Middlesex, England.

Lloyd Rakusen and Sons Ltd., Meanwood Road, Leeds 7, Yorkshire, England.

James Robertson and Sons (P. M.) Ltd., Golden Shred Works, 138 Bromley Road, Catford, London S. E. 6.

L. Rose and Company Ltd., Grosvenor Road, St. Albans, Hertfordshire, England.

Spring and Company Ltd., River Side, Brigg, Lincolnshire, England.

Wilkin & Sons Ltd., Tiptree, Essex, England.

MANUFACTURERS OF PRESERVE-MAKING EQUIPMENT

A. P. V. Company Ltd., Manor Royal, Crawley, Sussex, England.

Blundell and Crompton Ltd., West India Dock Road, London E. 14.

Wm. Brierley, Collier and Hartley Ltd., Bridgefield Street, Rochdale, Lancashire, England.

Clifford Coupe Ltd., 25-27 Hammersmith Broadway, London W. 6.

John Dore Engineering Ltd., Fowler Road, Hainault, Ilford, Essex, England.

T. Giusti and Son Ltd., Belle Isle Works, 210-212 York Way, London N. 7.

W. J. Hart and Sons Ltd., Keel House, 39-41 Margravine Road, London W. 6.

G. A. Harvey and Company Ltd., Woolwich Road, Charlton, London S. E. 7.

A. Johnson and Company (London) Ltd., Villiers House, Strand, London W. C. 2.

N. C. Joseph Ltd., The Aluminium Works, Stratford-upon-Avon, Warwickshire, England.

Robert Kellie and Son Ltd., 40 East Dock Street, Dundee, Angus, Scotland.

Maitlands (Metal Works) Ltd., 2 Eastvale Place, Glasgow C. 3., Lanarkshire, Scotland.

L. A. Mitchell (Metal Propellers) Ltd., 74 Purley Way, Croydon, Surrey, England.

R. Ramsden and Son Ltd., 1a Pembar Avenue, Walthamstow, London E. 17.

Rosegrove Engineering Company Ltd., Vulcan Works, Burnley, Lancashire, England.

Stainless Steel Vessels (London) Ltd., 4 Manorgate Road, Kingston-on-Thames, Survey, England.

Walker and Husler Ltd., Brewery Street, Birmingham 6, Warwickshire, England.

J. A. Welch (Plant and Vessels) Ltd., Stalco Works, Livingstone Road, Stratford, London E. 15.

Contributions Invited

Articles, preferably illustrated, on topics of interest to the food and allied industries are invited.

Whether it is a controversy to be debated, a problem to be discussed, a grievance to be voiced, an experience to be shared, an event to be recorded or an achievement to be highlighted, The Food Industries Journal provides the best medium of communication.

Contributions should be typed and normally not exceed 1,000 *words.*

FRUIT PRESERVERS WARN AGAINST OFFICIAL "HARASSMENT"

The U. P. Fruit Products Manufacturers' Association has urged the Government of India that only the Fruit Products Order — and not the Prevention of Food Adulteration Act — should be made applicable to the fruit and vegetable preservation industry.

The Secretary of the association, Mr. B. N. Tandon, has cautioned the Government that "dual control over the industry is neither legal nor possible." In a memorandum to the Union Minister for Food and Agriculture, he has warned that "police action" against the fruit and vegetable preservation industry under the P. F. A. Act would "kill it."

In the memorandum, Mr. Tandon has pointed out that the Act, which came into being much after the Fruit Products Order, is legislation of a general nature and, therefore, not applicable to the fruit and vegetable preservation industry.

The Fruit Products Order, he says, is meant specially for the industry. The order is being administered by the Agricultural Marketing Adviser to the Government of India having his office in Nagpur with zonal offices at different places. A technically qualified staff under him ensures the application of the order.

Mr. Tandon says that the "national industry" of fruit and vegetable preservation would have died in its infancy if the Fruit Products Order was used "as a tool for police action." The order is meant to ensure the application of hygienic and other conditions to the industry, to protect the interests of the consumer and to assist the industry in its development.

Mr. Tandon has referred to the drawing of samples and launching of prosecutions by the authorities in some States under the P. F. A. Act against manufacturers who hold licences under the Fruit Products Order. He declares that the Act does not apply to factories licensed under the Food Products Order and quotes the remarks of the Punjab High Court in "State versus Raj Kumar & Sons."

The court had said: "If he (the manufacturer) has conformed to the specifications laid down in the schedule, he is doing all that is required of him under the terms of the licence and it would be unfair to hold him liable under the general provisions of the Pure Food Act."

Stating that the drawing of samples and launching of prosecutions by the health authorities in States is in contravention of the rules and spirit of the Fruit Products Order, 1955, Mr. Tandon has requested the Minister to intervene and prevent the harassment of manufacturers by the authorities who have a "misleading conception of adulteration."

GOA TO GROW MORE BANANAS

The Banana and Fruit Development Corporation has included Goa among the places where intensive development of banana is to be undertaken for export. The other places are: Calcutta, Visakhapatnam, Madras, Pondicherry, Tuticorin, Cochin and Mangalore.

The Managing Director of the Corporation, Mr. S. Krishnamurthi, will visit Goa to study the potentialities for developing banana plantations, the incentives to be given by the Government to the growers and the road, rail and port facilities available.

It is proposed to bring 2,500 acres in Sanguem and Satari talukas of Goa under banana cultivation during the Fourth Plan. In pursuance of this scheme, 50,000 suckers of the "Basrai" variety of banana from Bangalore will be distributed among growers at a nominal price. The cultivation of the dwarf Cavendish variety of banana on an experimental basis has been carried out at the Government farm near old Goa.

Private growers will do the banana cultivation. The Goa Government will advance them crop loans of Rs. 500 per acre.

Japanese importers are understood to have offered the corporation Rs. 682.50 per ton of bananas packed in wooden crates. It is estimated that a 1000-acre banana plantation can fetch about Rs. 1 crore in foreign exchange.

Co-operative societies in Maharashtra and Gujarat are exporting bananas to the Soviet Union, Italy, Persian Gulf countries and West Pakistan.

Though India stands second in the world in the production of bananas, it exports the smallest quantity of the fruit.

It is said that banana grown on one acre fetches more foreign exchange than any of the traditional export commodities like coffee, cashew kernels and pepper.

REMODELLING SORGHUM PLANT

By DR. A. D. KARVE

UNTIL a few decades ago, the main emphasis in all plant breeding work was laid upon such criteria as the yield and the quality of the product. These criteria still continue to play an important role, but in addition to these, a number of new aspects must also be taken into consideration by the plant breeders of today. This does not necessarily mean that the task of plant breeding has become more difficult today than it was before. On the contrary, owing to more efficient international co-operation, the modern plant breeder has a much larger gene pool at his disposal. In the past all a breeder could select from were a few locally available varieties.

The new criteria that have entered into the field of plant breeding are a proof that agriculture, one of the oldest industries of man, is being radically rationalised. From an economic point of view it is imperative that a crop should not only give high yields but that it should give them in the shortest possible time and at the cheapest possible rate. Thus the yield alone is no longer the absolute measure of the suitability of a crop, because, if it costs too much to produce the crop, even a relatively high yielding variety becomes uneconomical.

POOREST PAYING BUSINESS

To cite an appropriate example, let us consider the cereal, sorghum, which forms the staple food of a majority of Maharashtrians. Most of the local varieties of this millet take about five months to mature and the yields hardly ever exceed ten bags of grain per acre. At the current fixed rate of Rs. 55 per bag of grain, the growing of sorghum becomes one of the poorest paying businesses indeed.

Let us analyse what is wrong with our local sorghum varieties. An individual sorghum plant looks quite impressive with its majestic height and girth. The earhead too is quite large, much larger than any of the other cereals except that of maize. And yet one finds that sorghum cannot compete with rice or wheat in yield or in the shortness of its cropping time. This is because the local varieties of sorghum cannot be planted at high population densities. Take a look at a well-grown field of rice or wheat. It presents an appearance of a continuous unbroken carpet. A sorghum field, on the other hand, looks thinly populated. If sorghum is planted densely, the individual plants compete among themselves for sunlight, with the result that the plants grow abnormally tall and produce only relatively small earheads, because all their energy is wasted in the excessive vegetative growth. Similarly, they grow tall if they are given heavy doses of chemical fertilisers.

This defect of our local varieties can be remedied by converting them into genetically dwarf varieties. This can be achieved within a few years by employing proper breeding techniques.

Since genetically dwarf plants just do not possess the faculty of growing tall, they can safely be planted close to one another, making it possible to increase the number of plants per acre and to obtain higher yields by using higher doses of fertilisers. Another advantage which most of the dwarf varieties have over their taller brethren is that, because their vegetative growth is limited, they mature earlier than the latter. Economically, this is a great boon, because not only does a shorter cropping period save money and give quick returns on the invested capital, but it also makes farming possible in relatively arid areas, where the moisture in the soil is not sufficient to raise a long-duration crop. The two new hybrid varieties of sorghum, CSH - 1 and CSH - 2, are shorter than the local sorghum varieties and they do mature earlier than the latter, but there is still a lot of scope for improvement in both these directions.

LONG AND BARE STALK

Although sorghum was a millet grown mainly in Asia and Africa, it has currently achieved a great popularity in the southern parts of the United States of America too. This has led to many changes in the external appearance of the plant. One of the striking features of all the American sorghums is the long and bare stalk, which raises the earhead clear off the foliage. The leaves of these varieties are all bunched up at the base of the plant and the earhead is borne on a long stalk, called the exertion of the earhead. In some varieties, this stalk can grow up to a length of even two feet. This character was introduced into these varieties, which are called the "combine" varieties, in order to facilitate mechanical harvesting.

The production of the long, leafless exertion is no doubt an unproductive waste of energy and it certainly affects the grain production adversely, but under the conditions prevailing in the United States it is more economical to have a variety with a long exertion and do combine harvesting than to have a short exertion and do manual harvesting.

Yet another labour saving renovation in the American sorghum varieties was the introduction of the extremely loose earhead type. In this case, the earhead consists of a bunch of long, slender and wiry rachillae, so that it looks more like a mop than like a normal earhead. The rachillae are so pliant that birds

(*Continued on next page*)

RECENT DEVELOPMENTS IN FRUIT AND VEGETABLE PROCESSING MACHINES

By S. C. M. SALTER, B.Sc. (Tech.), A.M.I. Chem. E.
Technical Officer, Food Machinery Association (London)

CANNING is a long-established, safe and relatively inexpensive method of preserving food in a form which is easy to store and transport. In more recent years other processing techniques, such as quick freezing and freeze drying, have been developed. The very considerably increased demand for processed foods has called for notable increases in the speed, efficiency and types of machines used in their preparation. A wide range of such equipment is made in Britain.

Retention of natural flavour demands that the time between picking and processing be as short as possible. For peas, mobile viners (1) are being increasingly used. They pick up the whole plant, separate the peas and return the vine to the field, the peas being loaded into hoppers. Bean harvesters (1) are also widely used.

For much of the produce the first preparatory operations are cleaning and peeling, for which a variety of mechanised equipment is available (1,2,3,4). For continuous peeling, particularly of potatoes and root vegetables, units are available incorporating a series of abrasive-covered rollers with outputs of as much as three tons/hour. The most recent development is the steam chamber and washer (e).

PREPARATION MACHINERY

Preparation of onions by hand is an unpleasant task and it is not surprising that topping, tailing and peeling machines (3) have had considerable success.

Fruit and vegetables are required to be diced and cut in a variety of ways. Ganged rotary knives are commonly used for cutting long produce such as

(*Continued from previous page*)

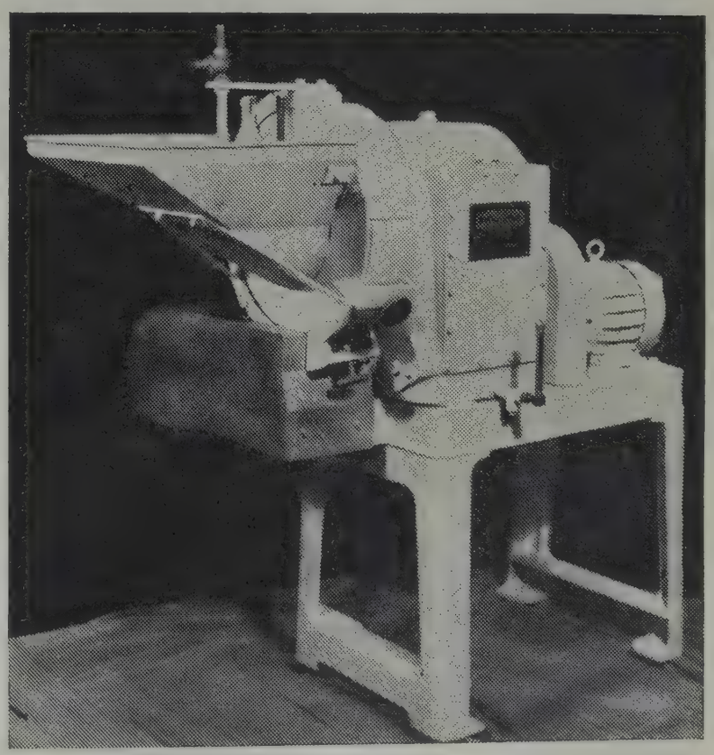
find no support if they try to perch on the earhead. As a result, these varieties are damaged to a lesser extent by birds than other varieties with a compact earhead. One could, therefore. do away with such protective measures as employing "bird-watchers".

STERILE STRAINS

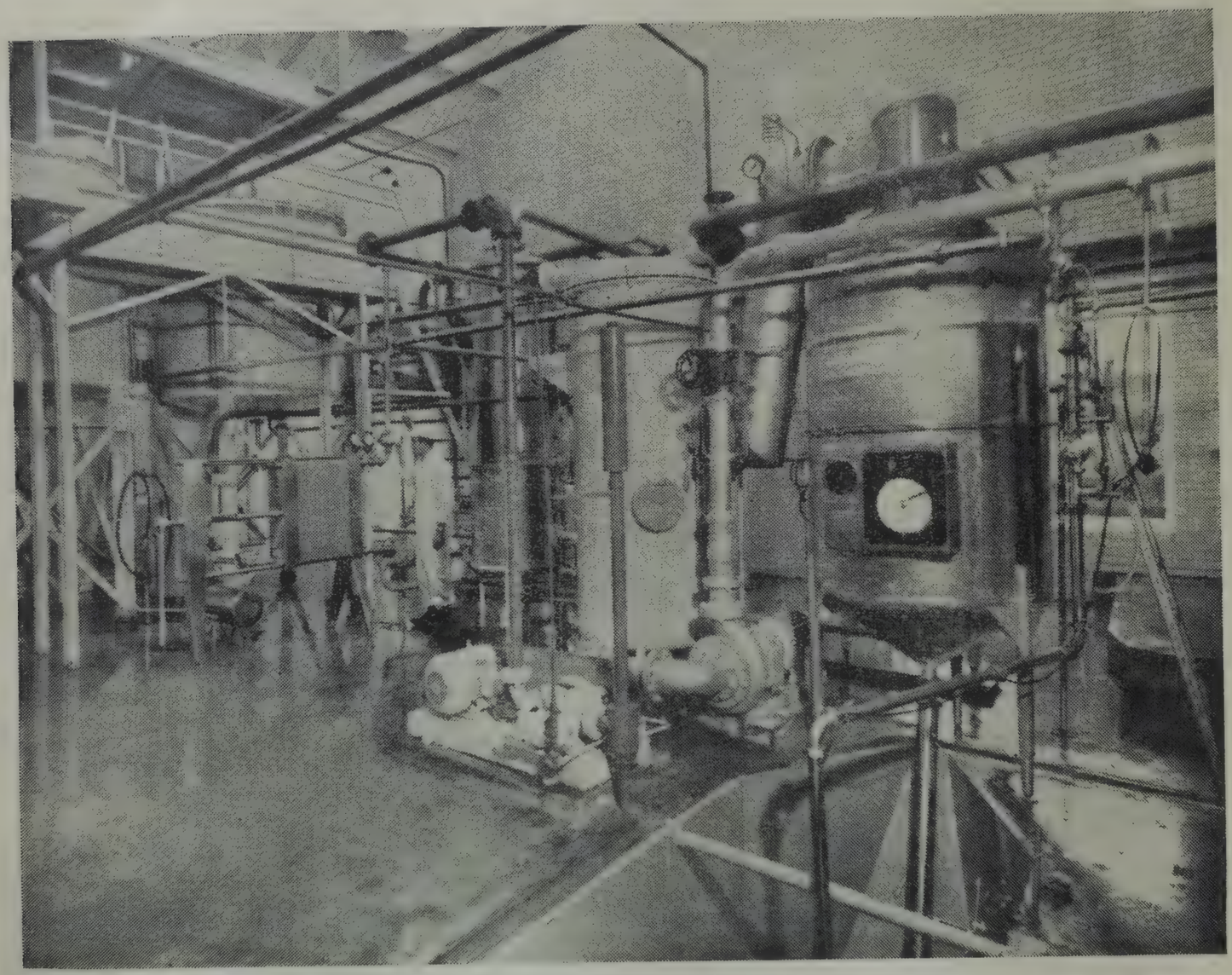
The advent of hybridisation has necessitated the development of yet another type of sorghum, namely, the male sterile strains. In order to produce hybrid seed it is necessary to cross two different varieties. But because a sorghum earhead contains both male and female florets, the seed that is normally obtained is self-pollinated. Cross-pollination would occur only if a variety were produced which carried no male floret of its own. Such varieties have been successfully developed and they are called the male sterile lines. The hybrid sorghum that is currently being produced in this country has been made possible by using one such variety.

Altogether, quite a lot of modifications have been made in the case of the sorghum plant and many more are possible. One has only to see the varietal nursery maintained by Nimbkar Seeds at Phaltan to realise what a vast array of different characters have been produced by nature in this plant. There are tall varieties and dwarf varieties with yellow, red, silvery, chalky, golden, brown, orange, or with pearly grain, varieties in which the grain is enclosed in the husk like that of rice, varieties for popping, for making amylose starch, for making cattle fodder, for making brooms and for making sorghum syrup.

The number of different possible combinations of all the different characteristics would be astronomical and by applying proper breeding techniques one could make sorghum do almost anything!



High-capacity rotary vegetable dicing machine with a capacity of three tons/hour. (Mather and Platt Ltd., Radcliffe Works, Radcliffe, Manchester, Lancashire, England.)



General view of the exit and of "Fre-Plo" continuous fluidised-bed quick freezer for peas. (J. and E. Hall Ltd., Dartford, Kent, England.)

rhubarb and celery, or for slicing peaches, apples and potatoes. In one machine (1), by the use of a special feed-in device, beans are fed at rates up to two tons/hour to a cutting head of 117 stainless steel knives giving a three-sixteenths inch (five-mm) wide. lengthwise cut. The company that makes this machine also produces a rotary dicing machine which not only dices up to three tons of potatoes or root vegetables per hour but can be simply converted for chipping or slicing operations. Two other companies (3,4) produce equipment for peel quartering, chipping and shredding, particularly for the production of marmalade.

With the increasing accent on product quality, inspection of the produce before canning or freezing becomes of greater importance. An important aid to the colour sorting of diced or small whole produce is an electronic machine (5) which scans each particle photoelectrically from all sides and automatically rejects defectives by air blast.

For the smaller cannery, or where a variety of produce is processed, each in moderate quantities, the batch-operated vertical retort is often still the most economic device for thermal processing. The retorts themselves have undergone little essential change, but instrumentation is now available for automatic programme control of the processing conditions. Machinery is also available for automatic marshalling of cans and loading cans into and unloading them from retort crates (1).

HYDROSTATIC COOKER

Time of processing required at a given temperature is largely governed by the time taken for heat to penetrate the can and permeate its contents. With packs that allow heat to be transferred by convection, the penetration can be improved by agitation of the can. Batch machines (6), in which the crates are rotated in a horizontal retort, and continuous machines (1,2) in which the cans are conveyed along a spiral track

and allowed to rotate, have been available for many years.

A more recent development is the continuous hydrostatic cooker, now made by a British firm (2). Their general form is that of a "W", the outer legs of which are occupied by tall columns of water which sustain the steam pressure in the centre legs. Cans pass continuously down the inlet leg where water temperature and pressure gradually rise to full operating conditions.

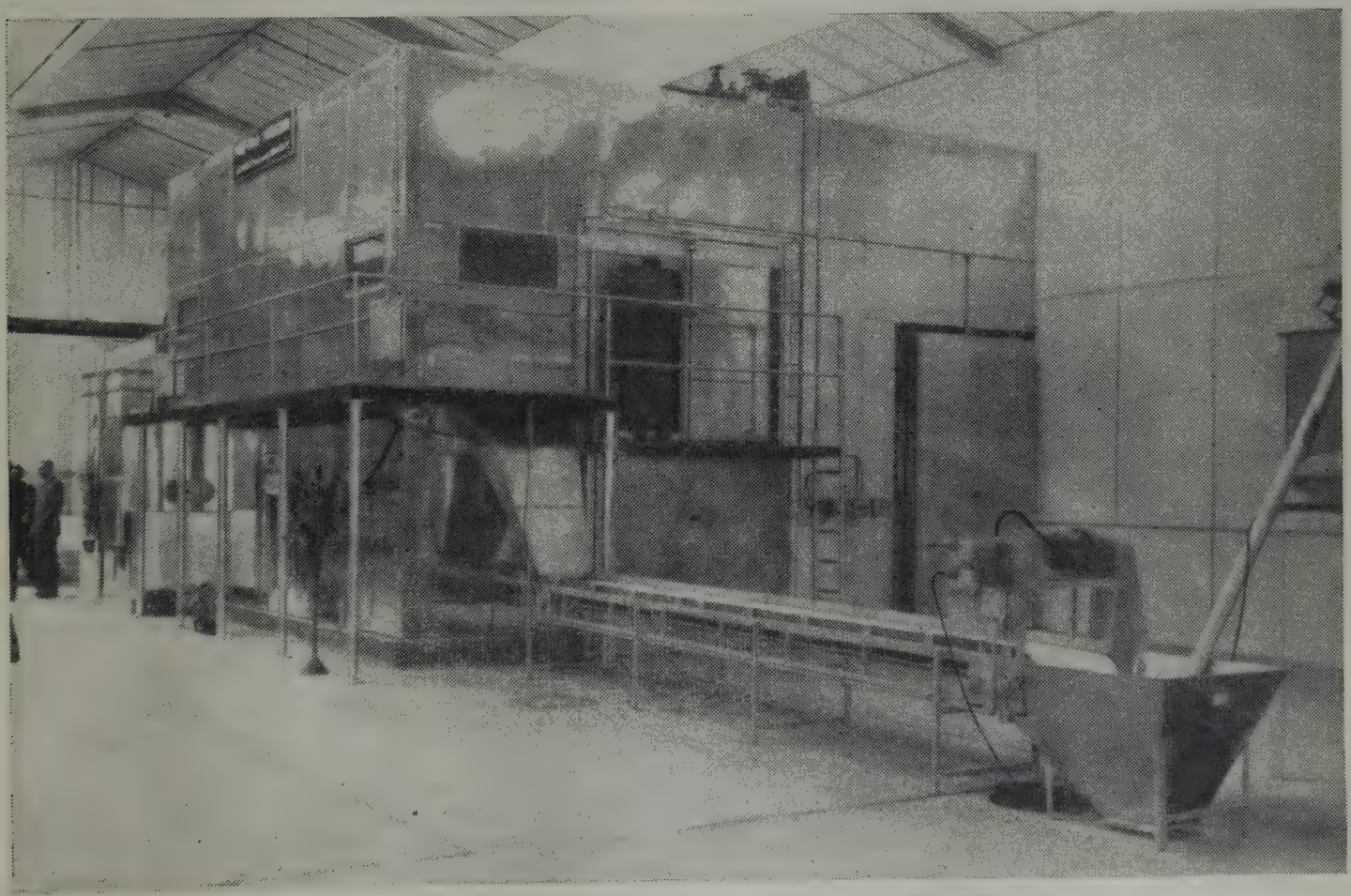
Conversely, in the exit leg they are subjected to a gradual decrease of temperature and pressure. Not only are inlet and outlet valves eliminated, but pressures are balanced throughout, thereby placing minimal strain on the can body and preventing rupture of produce within the can. Further, processing temperature and pressure can be readily varied by altering the height of water in the legs and thus, with one unit, a variety of produce can be processed. Floor area occupied for a given output is small, though against this must be set the need for high headroom or deep foundations.

Development of a number of new methods of processings (7) is continuing actively in Britain, with the object of more nearly approximating the ideal combinations of times and temperatures of processing to achieve sterilisation without overcooking the produce. Methods being considered to increase rate of temperature rise and penetration include positive spinning of can at some 100 revolution/minute; hot air, direct flame, and fluidised beds of heated solid particles—in place of steam. The other approach is to combat microbiological contamination by means other than heat, such as irradiation and antibiotics. The indication is that these will provide useful adjuncts to, and not replacement of, thermal processing.

QUICK FREEZING

In spite of quicker processing methods, some change from the original flavour cannot be avoided in the thermal processing of many kinds of produce. An alternative, which preserves the original flavour better, is to quick-freeze the produce. The disadvantage is the necessity for cold stores and refrigerated cabinets to maintain the produce in a frozen state until consumption.

The horizontal plate freezer is in common use (8,9); this generally consists of a number of superimposed, refrigerated, hollow metal plates, with a hydraulic mechanism to open the plate to receive the produce



Continuous jam processing line, showing mixing tanks, plate pre-heater, sulphur dioxide stripping column, condenser and separator. A plate evaporator for concentrating is behind the separator. (A. P. V. Company Ltd., Manor Royal, Crawley, Sussex, England.)

to be frozen and then close it to give the double contact necessary for quick and even freezing. This type is used mainly for the freezing of produce that is already cartoned.

A recently introduced vertical plate freezer (8) eliminates the use of trays: the produce can be fed directly into the spaces between the plates. On completion of the freezing cycle the plates are opened and the produce can be discharged mechanically at top, bottom or side as desired. Blocks of peas, Brussel sprouts and so on are produced which stack neatly in the cold store or pack readily into outer cases.

AIR-BLAST VARIANT

Another established variant is the air blast freezer (9,10) in which a stream of cold air is passed over produce arranged on the shelves of trolleys. For smaller outputs a batch unit is used; for larger outputs a continuous tunnel is generally employed holding a number of trolleys at any one time. To maintain subzero conditions, trolleys enter and leave through airlocks. An advantage of the blast freezer is its flexibility; by rearrangement of the trays, produce of varying sizes can be frozen.

A more recent development is the fluidised-bed freezer, in which the produce floats in an upward current of cold air. In this state the material behaves like a liquid. By using a perforated trough inclined at a slight angle the process can be made truly continuous, material fed in at one end flowing along the trough and discharging continuously at the other. Rate of flow is simply regulated by means of adjustable weirs. Heat transfer is very rapid. Further, since each particle is frozen individually the processed produce is free-flowing. The action is gentle and there is little or no damage to the produce. A British company (11) has supplied fluidised-bed freezers for a variety of produce such as peas and Brussel sprouts.

RAPID COOLING

The latest development is freezing by spraying with liquid nitrogen, which is becoming more readily available with the spread of tonnage air-separation plants. It can be conveyed in bulk containers to the user. Owing to the very low temperature (minus 196 degrees C), and the latent heat (170 Btu/pound—94,4 kcal/kg.) released on evaporation, the cooling effect is extremely rapid.

In conventional "quick" freezing, the dispositions of the chemical constituents of the material are changed and the physical structure disturbed by the comparatively slow formation of ice crystals. With liquid nitrogen, freezing is so rapid that these effects are much reduced, and it is possible to freeze delicate produce such as strawberries, tomatoes and asparagus, which are different or impossible to handle satisfactorily by other methods. When thawed, liquid-nitrogen-frozen produce shows smaller losses of structure and moisture than conventionally frozen counterparts.

Running costs of liquid nitrogen freezing tend to be higher than for other refrigeration methods, but capital cost and space requirement are lower. The method is also convenient for intermittent use. A British company (12) is actively pursuing developments in this field.

ACCELERATED FREEZE DRYING

In addition to canning and freezing, a third method of food preservation is by drying. A variety of hot-air dryers, including batch cabinet and continuous conveyor types, has been applied to the drying of fruit and vegetables in whole or sliced form. Disadvantages are changes of texture, colour and flavour. Use of vacuum to reduce drying temperatures can improve colour and flavour, but original texture is still generally largely destroyed.

By accelerated freeze drying, in which moisture is removed by sublimation from the frozen product under high vacuum, this last disadvantage can be substantially eliminated. Freeze-dried produce can also be rapidly reconstituted to a state closely resembling the original not only in texture, but also in colour and flavour. A further advantage is lightness of weight Disadvantages are the relatively high cost of plant and processing, and the necessity for good packaging or controlled storage conditions to prevent pick-up of moisture and consequent deterioration.

Significant progress has been made in the development of an uncomplicated batch unit (13) with reduced capital costs. It has a capacity of 1,100 pounds (500 kg.) of raw material and a daily throughput of one-and-a-half tons. Radiant heating is used and ethylene glycol is the heating medium. The maker of this equipment can also produce continuous plants said to be commercially viable on throughputs exceeding 14 tons/day.

MAKING OF JAMS AND JUICES

So far we have mainly considered methods of processing to preserve fruit and vegetables substantially in their original form. A brief reference will now be made to equipment for processing produce into other forms, namely purees, jams and jellies, juices and squashes.

A number of developments have been introduced in the old-established process of jam making. Vacuum pans (14) permit processing at lower temperatures, which results in better retention of flavour. There has been a rapid changeover in the production of confectionery jams from batch to continuous production, as the result of the introduction of a continuous desulphiting plant and jam concentrator (15). Ingredients are automatically metered to pre-mix tanks, the mixture heated in a plate heat-exchanger and fed to the top of a sulphite stripping column. Steam for stripping enters at the base of the column and passes counter-current to the descending jam mixture. The desulphited jam mixture is then concentrated, with

up to 72 per cent. solids, by passage through a plate evaporator.

Plate heat-exchangers and evaporators are obviously not suited to handling whole-fruit jams and a continuous cooker has been developed for this (3). After initial mixing, the ingredients pass through three mixing and heating compartments connected by weirs. The equipment is monitored by pH-value and temperature controllers. Cooling is assisted by adding a portion of the syrup required to the suction side of the pump that feeds the filling machine.

FRUIT JUICES AND SQUASHES

The major developments in the production of fruit juices have been in connection with evaporators for production of concentrates. The aim is to evolve methods of reducing the time and temperature of contact to retain the maximum of original flavour. In this field the plate evaporator (15) has proved successful with added practical advantages of compactness—particularly low headroom.

For maximum overall efficiency, improvement of cleaning techniques must go hand-in-hand with streamlining or production methods. It is no accident that there have been considerable advances in in-place cleaning for liquid processing plants. Automated plants are available in which the cleaning arrangements are incorporated as an integral part of the whole system.

In a recent fruit squash installation (15), the flow of all liquids is controlled by 366 air-operated hygienic valves, which are in turn controlled from central panels. For cleaning, the valves are switched to circulate cleaning solutions in an automatically controlled sequence and timing.

It has been possible only to provide an outline of some of the produce processing equiment available from Britain, and to hint at the developments taking place. Further information on any aspect of British plant and equipment can be obtain through the industry's trade association, the Food Machinery Association, 14 suffolk Street, London S.W.I.

Suppliers of equipment mentioned in the article:

(1) Mather and Platt Ltd., Food Machinery Department, Radcliffe Works, Radcliffe, Manchester, Lancashire, England.

(2) Mitchell Engineering Ltd., Food Machinery Division, The Bridge, Peterborough, Northamptonshire, England.

(3) William Brierley, Collier and Hartley Ltd., Bridgefield Street, Rochdale, Lancashire, England.

(4) Robert Kellie and Son Ltd., 40 East Dock Street, Dundee, Angus, Scotland.

(5) Gunson's Sortex Ltd,. Fairfield Road, Bow, London E. 3.

(6) John Fraser and Son Ltd., Millwall Boiler Works, Ferry Street, London E. 14.

(7) The Fruit and Vegetable Preservation Research Association, Chipping Campden, Gloucestershire, England.

(8) Jackstone Froster Ltd., Humber Bridge Road, Grimsby, Lincolnshire, England.

(9) Douglas Rownson Ltd., Daneshill, Basingstoke, Hampshire, England.

(10) York Shipley Ltd., North Circular Road, London N.W.2.

(11) J. and E. Hall Ltd., Dartford, Kent, England.

(12) British Oxygen Company Ltd., Hammersmith House, London W. 6.

(13) Vickers Ltd., South Marston Works, Swindon, Wiltshire, England.

(14) Mojonnier Bros. Company, Drayton Road, Tonbridge, Kent, England.

(15) A. P. V. Company Ltd., Manor Royal, Crawley, Sussex, England.

EXPORT POTENTIAL OF INDIA'S SEAFOOD INDUSTRY

By V. M. SRIKUMARAN NAYAR

Chairman, Marine Products Export Promotion Council

THE seafood industry occupies a predominant place among India's food industries. A unique feature of this industry is that it is wholly export-oriented. It is a matter of greater significance that of India's export-oriented industries, there is perhaps no other industry which holds out as much prospect for immediate expansion of exports as the seafood industry. This has been fully borne out by the impressive performance of the industry during the last few years. What has already been achieved is, nevertheless, only a fraction of what can be achieved.

The development prospects of this industry, according to the studies made by the Council recently, based on the resource potential of the fisheries in the coastal and offshore waters and other related factors, is in fact virtually unlimited and offers a greater challenge to the resources and talents of Indian industrialists and entrepreneurs than any other export industry of the country.

The fishing and seafood industry of the world has made greater progress and has developed faster during the last ten or fifteen years than in all the rest of its long history. The technological advances in oceanography, in methods of fish detection and capture, in craft and gear, in processing and preservation and in packaging, transport and distribution, made during these years, especially by the leading fishing nations, have made it possible for fishermen to set out to catch fish in any waters of the world with greater confidence and to deliver the product in any corner of the world in excellent condition.

RAPID STRIDES

One direct outcome of these developments is the tremendous increase in the international trade in fish products during the last few years. Today more than 40 per cent of the world catch enters the international trade. In tune with these major world developments, the fishing and seafood industry in India has made tremendous progress during the last decade. The growth of the industry during the period was characterised by progressive mechanisation of fishing, adoption of modern methods of processing and preservation, rapid expansion of the processing sector of the industry and above all a phenomenal increase in the export, especially of frozen and canned seafoods. (See table at the foot of the page).

The increase in export earnings during the plan period, as could be seen from the table below, was about 80 per cent and judged by any standards, this is no small achievement. This is all the more significant in view of the fact that in spite of our best efforts we were able to achieve only a partial recovery of the market for dried seafoods. The significant increase in the overall performance was, however, made possible by the dynamic growth of the canning and freezing sectors of the industry. The drastic change in the composition of exports brought about in the course of the Third Plan would be clear from the following statement :

Percentage composition of seafood exports at the beginning and at the end of the Third Plan.

	1961-62	1956-66
Frozen & canned seafoods	36%	82%
Dried seafoods	64%	18%

The upward trend in exports both in terms of quantity and value continued with increasing vigour. In fact, while the rate of increase until 1965-66 was of the order of Rs. 1 crore per year, the increase during the last year has been spectacular, the foreign exchange earnings during the year 1966-'67, the first year of the Fourth Plan being Rs. 17.36 crores, which is indeed high even after taking into account the devaluation rate. This was mainly accounted for by the quantitative improvements in the exports of frozen and canned shrimp.

The Marine Products Export Promotion Council established by the Government of India in 1961 has since its inception been concentrating attention on promotional and developmental aspects of the industry. For making a comprehensive assessment of the develop-

The following statement would indicate the pace and direction of progress during the Third Plan period:—

	1961-62	1962-63	1963-64	1964-65	1965-66
Frozen seafoods	91,91,655	1,72,77,471	2,60,93,614	3,86,71,664	4,71,96,099
Canned seafoods	49,48,371	81,25,479	67,51,337	68,47,484	97,91,294
Dried seafoods	2,49,86,261	1,63,96,911	2,78,83,523	2,58,19,156	1,27,66,987
Miscellaneous	62,330	1,91,451	1,43,121	1,49,515	2,77,945
Total	3,91,88,817	4,19,91,312	6,08,71,595	7,14,87,819	7,06,32,325

ment potential of the industry with particular reference to the augmentation of exports, a seminar on marine products exports was organised by the Council in collaboration with the Indian Institute of Foreign Trade in 1964. This seminar, which was attended by leaders in the industry, leading scientists and technologists connected with fisheries research and fisheries development, fisheries administrators of the maritime States and the officials of the Ministries concerned of the Government of India, fully recognised and accepted for the first time the immense scope for the development of the industry and the expansion of exports and the export target for the Fourth Plan was recommended to be fixed at Rs. 20 crores (at the pre-devaluation rate).

The deliberations in the seminar as well as the subsequent studies made by the Council have established beyond doubt that only an adequately expanded fishing effort could ensure the attainment of the target. This has become all the more necessary in view of the fact that the development of the freezing and canning sectors of the industry have outstripped the resources for catching fish, resulting in an abnormal rise in the material prices and consequent squeezing of profits.

MECHANISED BOATS

Although in the course of the Third Plan period mechanical fishing craft and gear have progressively replaced outmoded craft and gear, almost all the mechanised boats launched so far were only small vessels varying in length from 30 to 42 feet. These vessels can operate only in the inshore waters within about ten miles' range from land. Fishing even today is, therefore, mostly confined to the inshore waters, while the offshore resources, which are much greater, remain virtually untapped. For a fuller utilisation of the resources, it is necessary to press into service large trawlers capable of operating in offshore waters and more mechanical boats for a more intensive exploitation of the inshore waters. The additional craft requirements and the corresponding capital investment have been estimated as follows:—

Year	Number of boats		Capital requirements	Foreign exchange component
	Small boats	Big boats	(Rupees in lakhs)	
1966-67	500	52	800.50	443.00
1967-68	500	45	817.50	456.00
1968-69	400	37	653.00	355.00
1969-70	350	26	581.50	261.00
1970-71	250	10	347.50	175.00
Total	2000	160	3140.00	1690.00

As the existing entrepreneurs in the industry have already made a very large investment in mechanised boats, it is very unlikely that they could mobilise to any substantial extent the further resources required for the expansion of the fishing fleet, especially in the matter of big trawlers. The public sector would, therefore, have to play a vital role in the programme of launching big trawlers. A good percentage of the big trawlers to be launched during the Fourth Plan will have to come from the public sector itself. Further, to attract private investment, substantial assistance in the form of loans for capital from the public sector and public-sector investment corporations as well as Government subsidy may have to be provided. Entrepreneurs and financiers outside the industry would also do well to take up the challenge.

FOREIGN ASSISTANCE

Another problem relates to the skippers and technicians required for operating the big trawlers. Trained personnel of the required calibre is not available in India. It is, therefore, very essential that until such time as we are able to train the required number of skippers and technicians in India itself, foreign skippers and technicians are allowed to be employed in big trawlers.

A large fishing fleet cannot operate without certain basic facilities such as fishing harbours maintenance workshops, slipways, dry docks. etc. Further, ice, which is indispensable for preserving fish from the time it is caught till it is finally processed, is inadequate even for the present production of fish. The stepping up of ice production adequately is as important as launching more fishing vessels. Though the private industry can be relied upon to a certain extent to increase ice production, the magnitude of the task ahead is such that the Central and State Governments will only be able to mobilise the massive effort required for ensuring adequate supply of ice throughout the season at all strategic points on the coastal areas near landing centres at economic prices.

FACILITIES LACKING

Urgent attention is also required in providing sufficiently large cold storage facilities at important fish landing, processing and export centres at a reasonable cost. Good water is in scarce supply in the processing centres, causing difficulties in the production of quality goods. Transport facilities from landing centres to processing centres and from processing centres to points of export have to be adequately enhanced by the provision of many more insulated and refrigerated trucks.

To ensure the planned development of the industry on an integrated basis, the Council made a detailed study of the entire developmental requirements of the industry for the Fourth Plan period, including the craft and gear requirements outlined earlier, and a comprehensive programme was prepared and submitted to the Government for implementation.

It is hoped that the projects recommended by the Council, which are directly concerned with the development of the export-oriented sector of the industry, will receive top priority in the Fourth Plan for fisheries development. The Council is confident that the progressive implementation of these projects will open up a developmental era in the history of the industry, leading to the achievement of higher and higher export targets in the years to come.

FOOD NEWS

ONION DEHYDRATION PLANT TO BE SET UP IN NASIK

CO-OPERATIVE societies in Nasik District have come together to set up an onion dehydration plant at a cost of Rs. 46 lakhs. A share capital of Rs. 2.5 lakhs has been raised by 352 co-operatives. They will seek a loan of Rs. 30 lakhs from the Industrial Finance Corporation.

The plant, to be errected in collaboration with a French firm, will have the capacity of processing 30 tonnes of onions per day. The French fiirm is believed to have undertaken to find buyers in France for 80 per cent of the output.

Nasik produces 200,000 tonnes of onions a year.

EXPORT OF CANNED FOODS

A spurt of more than 50 per cent was registered in the export of canned and bottled fruits and vegetables in the first nine months of 1966-67 over that of the entire 1965-66 financial year.

While the value of exports of these products for 1965-66 was Rs. 43.40 lakhs, it was Rs. 66.65 lakhs in the period April, 1966, to January, 1967.

Considering that the rupee was devalued in June, 1966, the export performance is creditable.

Pickles and chutneys valued at Rs. 47.39 lakhs were exported in the nine months of 1966-67 against Rs. 44.71 lakhs in the whole of 1965-66.

The main importers of all these commodities were the United States, the United Kingdom, the Soviet Union, West Germany, Canada, the United Arab Republic, Iraq, Kuwait and Malaysia.

FALL IN PEPPER EXPORT

The export of pepper and ginger has fallen in the season that commenced in November, 1966.

Overseas demand for Indian pepper declined from 26, 305 tonnes in 1965-66 to 20, 052 tonnes in 1966-67.

The apprehension is that the demand would be even poorer because of the fall in prices abroad by 20 per cent. An added reason is the larger availability of Indonesian pepper at a competitive price. Most buyers of Indian pepper in the international market, including communist countries, have cut down imports. From November, 1966, to February, 1967, the export of ginger came down to 1,569 tonnes from 1,714 tonnes in the corresponding period last year.

PACKED POULTRY MEAT

Poultry meat packed in polythene bags will be available in major cities in Maharashtra next year. A plant capable of dressing 8,000 fowl per day will come up in Poona by the end of 1967.

The Director of Animal Husbandry, Maharashtra Government, Dr. S. A. Rehman, told newsmen that the Rs. 55-lakh plant will have four refrigerator vans to carry dressed fowl to different places.

FILLIP TO GRAPE GROWERS

Grape-growing will be encouraged in the East Nimar area of Madhya Pradesh by the State Government. It proposes to give Rs. 1,02,000 as loans to growers this year to grow grapes on 34 acres in the district. Last year, Rs. 42,100 was given for growing grapes on 15 acres.

The Government will provide fertilisers and insecticides and also technical guidance to the growers.

POONA CANNING FACTORY

Fruit merchants and growers have set up a canning factory at Satara Road. Maharashtra's Minister for Power and Industries, Mr. R. A. Patil, who inaugurated the Rs. 7-lakh factory, said the Government would extend all help to the food preserving and processing industry.

GUJARAT FISH OUTPUT

The annual catch of fish in Gujarat is planned to be raised to 120,000 tonnes by the end of the Fourth Five-Year Plan period from the present catch of 110,000 tonnes, it was said in Ahmedabad by the Parliamentary Secretary in charge of fisheries, Mr. Anwar Baig Mirza.

While 90 per cent of the total catch was sent to Bombay, Delhi and Calcutta, dried prawns worth Rs. 15 lakhs were exported to the United States, the United Kingdom, Ceylon, Hong Kong and some African countries.

CO-OP. CASHEW FACTORIES

The Government of India has plans of setting up three co-operative cashew processing factories in the country in the Fourth Plan period. They will be located in Maharashtra, Orissa and Madras.

There are 241 cashew processing factories in the country. Of them 201 are in Kerala, 12 in Madras, 10 in Mysore, nine in Maharashtra, five in Goa, three in Andhra Pradesh and one in West Bengal.

The Director of the Cashew Development Council, Mr. K. Ramunni Menon, told newsmen in Calicut that the export of cashew kernel and shell liquid reached a record figure of Rs. 44.8 crores in 1966-67. Because the indigenous production of nuts was low, 135,000 tons of raw nuts worth Rs. 23.42 crores had to be imported during this period from East African countries.

The net foreign exchange earned through the export of cashew products in 1966-67 was Rs. 21.38 crores against Rs. 14.17 crores in 1965-66.

Mr. Menon said that, as the East African countries were trying to set up modern cashew processing plants with foreign collaboration, India might not be able to import raw nuts in sufficient quantity after some time. Therefore, it was essential that self-sufficiency in cashew production should be achieved.

Mr. Menon stated that the Cashew Development Council had formulated plans for increasing production. It proposed to give a manure subsidy of Rs. 50 per acre and a plant protection subsidy of Rs. 25 per acre. A loan of Rs. 150 per acre will also be given and technical assistance provided wherever possible.

Mr. Ayyadorai, Deputy Director of the Council, said that experiments were being conducted at the cashewnut research stations at Ullal (Mysore), Anakkayam (Kerala), Vengurla (Maharashtra), Bapatla (Andhra) and Vridhachalam (Madras) for evolving high-yielding varieties of cashew.

CASHEW CROP OUTLOOK

A bumper cashew crop of 90,000 short tonnes is forecast for India in 1967. This figure refers only to commercially exploitable produce. The actual production is estimated at 150,000 tonnes. Much of the cashewnut is consumed locally or is lost on account of unscientific processing and exploitation.

The forecast for the current year is 12 per cent. above the 80,000 tonnes yield in 1966 and 11 per cent. above the average production for the period 1960 to 1964.

India will, however, have to import raw cashew for its processing industries and 176,000 tonnes are expected to be imported this year.

The export of kernel this year may total 56,200 tonnes against 52,600 in 1966 and a 1960-64 average of 52,200 tonnes.

The Cashew Export Promotion Council has urged the Government of India to give cashew exporters the import entitlement of five per cent. in full.

The import entitlement allowed at present to exporters was not sufficient to meet their requirements.

Cashew exporters are allowed at present to import tinplate of the value of 1.5 per cent. and box strapping to the extent of 0.5 per cent. of their exports.

PUNJAB TRACTOR FACTORY

The manufacture of 10 h.p. to 12 h.p. four-wheeler tractors is to be undertaken by the Punjab State Industrial Development Corporation. A Rs. 5-crore plant with Japanese technical know-how will turn out 4,000 tractors every year. The ultimate production target is 12,000 tractors.

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The Union Minister for Industrial Development, Mr. Fakhruddin Ali Ahmed, believes that India will not have to import tractors by the end of the Fourth Plan.

He told the Lok Sabha that the demand for tractors in the Fourth Plan period was estimated at 40,000 per year. The total licensed manufacturing capacity of the private sector was 30,000 tractors per year. The setting up of a public-sector factory, with a capacity of 12,000 tractors per year, was under consideration.

DIESEL ENGINE PLANT

A Rs. 5-crore marine diesel engine manufacturing factory will be set up in the public sector with Japanese collaboration. About 1,000 engines of 33 h.p. to 90 h.p. will be initially manufactured by the factory which is expected to go into production in 1969. On expansion, it will produce engines of 100 h.p. to 150 h.p. The engines are meant to be fitted on deep-sea fishing boats.

APPLIED NUTRITION BLOCKS

The Applied Nutrition Programme has been introduced in five of the 16 blocks to be covered in Maharashtra during the current year, bringing the total number of blocks under the programme to 25. This information was given by Mr. R.G. Salva, Secretary to the Rural Development Department, while addressing the State-level Co-ordination Committee of Applied Nutrition Programme at Aurangabad on July 20.

SCHOLARSHIPS OFFER

Seven scholarships will be given by the Altrusa Club of Bombay to needy women for studying canning and food preservation at the Institute of Catering Technology at Dadar. One scholarship will be given for a post-graduate course in dietetics.

SOYABEAN FACTORY

Licence has been given for setting up a plant for processing soyabean in Bombay. Machinery for the plant, which will produce soya milk and other products, will be imported from the United States.

NEW PRODUCTS AND PROCESSES

LIQUOR FROM CASHEW APPLE

CASHEW apple, now largely wasted, can be profitably utilised in the manufacture of liquors and Vitamin C tablets.

Scientists at the Central Food Technological Research Institute at Mysore have proved that good quality liquor can be distilled from cashew apple. Experiments conducted at the CFTRI have shown that cashew juice retains its vitamin and mineral contents even after distillation.

Revealing this at a press conference in Calicut, Mr. Ramunni Menon, Director of the Cashew Development Council, said that, if even one-third of the three lakh tonnes of cashew apple now going waste was used in the distillation of liquors on a commercial scale, the country could earn at least Rs. 15 crores.

Mr. Menon said that except in Goa, cashew apple was not commercially exploited by the brewery industry. A private distillery at Chalakudy, in Trichur District, was trying to use cashew juice. The main difficulty with cashew was that it was a seasonal crop. But this could be overcome if cashew juice is used in breweries which used other materials also for distillation. The Cashew Development Council was taking up the question with the Union Government.

PROTEIN ISOLATE FROM COTTONMEAL

A Los Angeles (U.S.A.) firm has widely advertised in Indian newspapers an "exclusive patented process" to produce high-grade protein isolate in powder form from cottonmeal. The powder, "colourless and tasteless, can be blended easily with flour or other basic foods to provide necessary protein in human diet where nutrition problems exist," the firm claims.

The advertisement also says a valuable by-product of the process is a premium gossypol-free 18% animal feed.

The firm gives its address as "Wortrain V," World Traders and Investments Inc., 685 South Corondelet Street, Los Angeles, California, U|S.A.

WIDE RANGE OVEN

A new wide range oven with improved efficiency is now available from Toshniwals.

This oven has a wide range of applications for ageing, baking, drying, conditioning, evaporating and sterilising in rubber, chemical and food processing industries, electronic field research and laboratories of educational and research institutions.

It is a (1) convection oven with vent open and without fan; (2) fan-circulated closed oven with vent closed and fan switched on; and (3) forced-draught oven with vent open and fans switched on.

It has a stainless steel chamber with a robust metal case. It attains rapid heat-up. Its other merits are quick recovery and no overshoot. The heater unit is simple and durable, and the vent is adjustable. Equipped with removable trays, it has a temperature range between 40°C and 300°C with an accuracy + 0.5°C.

Further information can be had from the sole selling agents: Messrs. Toshniwal Brothers Pvt. Ltd., 198, Jamshedji Tata Road, Bombay – 1, or their branches in Calcutta, Madras and New Delhi.

CADBURY "5 STAR"

Cadbury Fry, the well-known makers of quality chocolates, have added "5 Star" to their wide range of milk chocolates.

QUESTION BOX

An FIJ Service

The Food Industries Journal has been receiving inquiries from readers about the availability of machinery needed by them to modernise their plants and boost production. As a free service to our readers and in the hope that useful information will come in, the Journal will from time to time publish the inquiries that are received. If other readers have the information sought, they are requested to write to the Editor who will pass on all information received to the readers concerned.

We have now two inquiries :

A firm engaged in the manufacture of a malt beverage wants to know where he can get the following automatic or semi-automatic machinery :

1. **Bottle washing machine.**
3. **Bottle drying machine.**
3. **Bottle filtering machine.**
4. **Bottle labelling machine.**

A rice mill owner of Shamgarh seeks information on the availability of machines for the production of corn flakes, pohwa, etc.

FOCUS ON RESEARCH

'MILK WITHOUT MOTHERHOOD' FROM DAIRY COWS?

TWO Michigan State University (MSU) scientists believe they have found the "missing link" that will enable them to get acceptable levels of "milk without motherhood" from dairy cows.

This finding could not only provide another important milk supply, but it would also prevent the slaughter of many potentially valuable but infertile cows.

The scientists, Doctors Joseph Meits, MSU physiologist, and H. Allen Tucker, MSU dairy scientist, point out that getting milk from calfless, unbred heifers and cows is not new. But, until now, the amount of milk obtained from these animals was usually far short of the level considered "acceptable" by commercial dairymen.

Part of the problem has been a lack of sufficient udder (mammary) development to support good milk production. Another has been the lack of a reliable method to start milk production after the udder was developed.

USE OF HORMONES

After several years of research, Doctors Meites and Tucker believe they can now stimulate mammary growth and development with proper use of two hormones, estrogen and progesterone, which are produced by the ovaries.

Even more important, they have found that hormones from the cortical portion of the adrenal glands can start lactation.

The scientists are optimistic that a combination of these hormones — estrogen and progesterone to induce optimal udder growth and adrenal cortical hormones to initiate lactation — could result in acceptable milk production from unbred cows and heifers.

And while this has not yet been accomplished, it offers fantastic implications for the dairy industry.

Neither Dr. Tucker nor Dr. Meites expects immediate success in their project. Many years of study by scientists throughout the world have already been spent on similar projects, and all have fallen short of "acceptable" milk production.

"We began working on projects like this just before and soon after World War II, recalls Dr. Meites. "We were able to bring many animals into milk production, but the majority produced less than 25 pounds (11.3 kilograms) a day. The project was finally abandoned as being impractical.

"But, in the last three to four years, as a result of MSU experiments with rats and rabbits, we believe we may have found the 'missing link' to good milk production. The adrenal cortical hormones were found to be essential for initiating lactation — more important than anyone had originally thought."

During this time, Dr. Meites and his colleagues were able to bring pregnant rats and rabbits into milk production without disturbing their pregnant state. In the last two years, Dr. Meites began collaborating with Dr. Tucker to test an adrenal cortical hormone on dairy cattle.

After just four to six injections (one a day for four to six days), udders began to fill up and the animal began coming into milk.

UNDER DEVELOPMENT

It was during this study that Doctors Tucker and Meites noticed that the animals farthest along in pregnancy generally produce the most milk. This was attributed to their greater udder development.

It was then that the scientists began experimenting with different combinations of estrogen and progesterone to develop the udder to the size it would be at at the end of pregnancy.

To find out the best combinations of these hormones, the scientists used cows from which the ovaries had been removed. Since the ovaries are responsible for producing these hormones in normal dairy animals, removal of the ovaries allowed exact measurement of the level and combination of these hormones injected by the scientists.

The MSU scientists expect to give the "best" combination of hormones to some other unbred dairy animals in order to determine whether acceptable milk production can be achieved.

Dr. Meites is guardedly optimistic about the success of the project: "We know we can stimulate milk production, and we know we can increase mammary growth. But we still aren't sure how much milk we will be able to get from these animals."

Even if unsuccessful there are some "fringe benefits" that might be realised from this project. For example, Dr. Meites noted in early experiments conducted just after World War II that about one-third of the animals in which lactation had been induced could be bred after they completed their lactation.

COMPANY NOTES

POLSON'S EXPANSION PLANS

Polson Ltd. plans to expand and diversify its activities. A pilot plant for cheese manufacture has been established at Ootacamund and good quality product is expected to be marketed soon.

Total sales of the company for 1966 were Rs. 2.11 crores against Rs. 2.13 crores, showing a fall of Rs. 2.22 lakhs. The profit, after providing for taxation, has amounted to Rs. 6.60 lakhs (Rs. 6.03 lakhs). The total sum available for distribution is Rs. 6.82 lakhs (Rs. 6.44 lakhs).

During the year the production of butter at the Anand and Patna dairies was hampered owing to some unfavourable factors. Prices of raw coffee were pegged at high levels which affected business.

The current year's working of the company so far has been satisfactory and sales during the first five months were higher by about Rs. 5 lakhs compared to the corresponding period last year.

Presiding over the annual general meeting in the absence of the Chairman, Mr. D. M. Khatau, Dr. R. C. Cooper, a Director, said that the company hoped to maintain the divided on the increased capital during the current year.

SUNDATTA'S OUTLOOK

Owing to uncertain conditions in the vegetable oil industry, the Sundatta Foods and Fibres Ltd. is planning to diversify its activities in the near future.

Presiding over the company's annual meeting in place of Mr. N. D. Sirur, the Chairman, Mr. G. V. Sirur, a Director, said the current year's working of the company was not very satisfactory on account of several factors like high prices of raw materials, industrial strife and the Government's policy of stopping hedge contracts in the seeds business.

The gross profit of the company for the year ended October 31, 1966, has dropped to Rs. 9.26 lakhs from Rs. 12 lakhs in the previous year. Sales increased from Rs. 1.94 crores to Rs. 2.96 crores.

The Directors have once again skipped equity dividend, but they have decided to clear arrears of preference dividends from April, 1959, to March, 1960, which would absorb Rs. 53,044.

During the year, the company processed 26,376 tonnes of cottonseed and 74 tonnes of groundnut cake. The company also exported cottonseed cake of the total value of Rs. 46.22 lakhs.

L & T REPEATS

Larsen Toubro Ltd. proposes to maintain its equity dividend for the year ended March 31,1967, at 15 per cent.

The company's working for the year has been encouraging, with gross profit moving up from Rs. 154.56 lakhs to Rs. 181.05 lakhs — a rise of 17 per cent. The company's income from sales, servicing, commission. etc., rose from Rs. 12.85 crores to Rs. 14.91 crores, recording an increase of 16 per cent. Its manufacturing output was up by 32 per cent.

As for the current year, the company has started with a backlog of valuable orders which should ensure satisfactory results. Competition, however, has been keen and operating expenses have been rising. The Chairman, Mr. H. Holck-Larsen, feels that with the continued emphasis on better techniques and quality, improved marketing and further diversification, the company can regard the future with confidence.

The Chairman has indicated that an issue of equity shares will be made shortly to finance partly the expansion programme.

E. I. D. PARRY SALES UP

The Directors of E.I.D. Parry Ltd. have proposed a gross interein dividend of 2.25 per cent. for the year to September 30, 1967. The dividend will be paid on September 4.

Sales of the company for the half year ended March 31, 1967, amounted to Rs. 18.32 crores against Rs. 12.94 crores for the corresponding period last year. Sales for the whole year ended September 30, 1966, totalled Rs. 29.86 crores.

Net profit for the half year was higher at Rs. 1.09 crores against Rs. 27.75 lakhs for the same period last year. Net profit for the whole of 1965-66 was Rs. 1.23 crores.

The production of sugar during the half year ended March 31, 1967 totalled 29,047 tonnes against 21.851 tonnes during the corresponding period of the previous year. The season closed on May 10 with a total sugar production of 31,787 tonnes. The chemicals division had satisfactory sales at a better margin of profit. The total sales of fertilisers exceeded those of the first six months of the previous year by 54,000 tonnes. The supply position of sulphur for the company's Ranipet factory remained difficult but the contracts completed so far will ensure satisfactory supplies up to the early part of 1968.

INTERNATIONAL PROTEIN FOODS SYMPOSIUM RECOMMENDATIONS

THE International Symposium on Protein Foods and Concentrates, which was held in Mysore in June-July, made several important recommendations to bridge the protein gap. A brief summary of the recommendations as also the texts of the important speeches were carried in the July issue.

The recommendations of the symposium fall under the following eight heads:

1. Making maximum use of available protein supplies;
2. Improving conventional protein foods;
3. Utilisation of available unconventional protein resources;
4. Assuring safety of protein foods;
5. New sources of proteins;
6. Production and marketing of new protein foods;
7. Nutrition education of the public;
8. Research and training in food technology and nutrition.

TEXT OF RECOMMENDATIONS

1. Making maximum use of available protein supplies :

Give the highest priority to the production and effevtive use of conventional plant and animal protein sources suitable for direct human consumption. This will require use of the best-yielding plant varieties along with adequate fertilisers, pesticides, equipment and other requisites of modern agriculture, including irrigation and drainage where necessary. Efficient planning for increasing the supply of milk, meat and eggs should also be undertaken so as to ensure optimum utilisation of feeds for maximum production; the limited feed and fodder resources should not be wasted on unproductive animals. Programmes for introduction of high-yielding breeds should be undertaken.

Take urgent steps to increase substantially the catch of marine and fresh-water fish and their distribution to consumers in fresh and processed form. This will require modern fishing equipment, port storage facilities, rapid transport, processing technology and other steps aimed at modernising the industry and making it capital-intensive.

Give high priority to the conversion of surplus fish into acceptable fish protein concentrates (FPC) of high biological value. Such FPC will supplement the maximal use of fish in fresh and dried form.

Give high priority to reducing preventable losses of protein foods due to rodents, insects and spoilage in field, during storage, transport and in the home. Field and storage losses of food due to rodents and insect infestation are high in the developing countries due to inadequate control measures and lack of proper storage facilities. The available technology could be used effectively to reduce these losses and maintain nutritional and calorific value.

Give high priority to the utilisation of all potential protein for human consumption since the present and projected level of production of conventional protein foods alone is not sufficient to meet the protein demand in the foreseeable future. This will require undertaking agro-economic studies to determine the protein and fat production per hectare for various oilseeds, legumes and other crops in order to plan optimum production at minimum cost.

2. Improving conventional protein foods :

Strength collaboration among plant and animal breeders, nutritionists and technologists in order to select or develop acceptable varieties of crreals oilseed, legumes and animal products with higher protein quantity and quality, and to ensure their prompt introduction. The discovery of the genes Opaque 2 and Flowery 2 for improving the protein quality of corn (maize), and varieties of gossypol-free cottonseed, are examples of such desirable developments.

Supplement cereal staples as a means of rapidly improving the nutritive value of diets of large population with minimum change in food habits wherever it is nutritionally desirable and technically and economically feasible. Supplementation should include addition of amino acids, protein concentrates, vitamins and minerals, as necessary and practical. The large-scale production of lysine and methionine is to be encouraged in those developing countries in which the size of the potential market justifies it and the manufacture of tryptophan and threonine should be undertaken when it becomes economical to do so. Cereals imported from producing countries should be fortified as well as those produced and milled on an industrial scale within the country. Supplementation should be extended (wherever possible) to small mills in rural areas as necessary and economically feasible.

Fortify (as desirable and economically feasible) processed protein foods based on oilseeds, oilseed meals and legumes intended for feeding infants, pre-school children and other vulnerable groups. Limiting amino acids, vitamins and minerals which are to be added to these foods in appropriate amounts.

3. Utilisation of available unconventional protein resources :

Give preference to the ever-increasing utilisation of oilseed protein for human consumption over other commercial uses. With improved technology and acceptance of processed foods, it will be possible to divert more oilseed meals for human consumption.

Support and expand the production and use of soyabean protein concentrates in formulations of high-protein foods for human consumption where this crop can be grown economically. Soyabean technology is now highly developed in several of the industrialised countries, particularly the United States and Japan, and should be applied more widely.

Give increased attention to the processing of larger quantities of groundnuts (peanuts) in order to produce more protein concentrates for human consumption as well as needed oil where this crop is abundant. The value of groundnut protein concentrates, suitably supplemented to improve the protein

quantity, has already been demonstrated in a number of food products.

Give continued encouragement to the development of isolated groundnut (peanut), soya and other oilseed proteins as a useful raw material for various formulated baby foods and for extension or replacement of milk protein in dairy-type products. Although such isolated proteins may at present be too expensive for most programmes concerned with preventing protein malnutrition among low-income groups, production of such proteins provides an effective means of getting industry involved in the production and distribution of oilseed protein materials.

Make use of sesame protein concentrate in foods for vulnerable groups, where sesame is available in adequate quantities at a reasonable cost. Its high content of sulphur-containing amino acids makes it particularly useful for this purpose, but care has to be taken to exclude oxalate contamination by removing the hulls completely during processing.

Take energetic measures to produce high-quality cottonseed protein concentrates suitable for human consumption. Cottonseed can add substantially to the total resources of food protein and help to meet the shortage of edible oil. [See article elsewhere in this issue].

Intensify research on improved methods for obtaining a low-cost coconut protein concentrate of high nutritional value. Coconut protein is of high quality and coconuts are a readily available raw material in certain protein-short areas. Edible coconut concentrates, and in same cases, whole coconuts can themselves be useful as supplements to protein foods. The feasibility of producing and marketing coconut protein concentrate should be determined.

4. Assuring safety of protein foods :

Establish quality standards for protein foods and concentrates. Only those foods which meet these standards of nutritional values and safety should be distributed. Advantage should be taken of those guidelines laid down by the PAG. (Protein Advisory Group of FAO, WHO and UNICEF).

Take all possible steps to introduce sound practices in field, storage, transport, markets and factories to minimise the incidence of mould toxins. More information is needed on the production stages, geographical areas and times of the year at which aflatoxin arises in groundnuts (peanuts) and groundnut products and in other foods. Education and extension services should be focussed on this problem and appropriate inspection and control procedures introduced at all stages. The desirability of offering incentives for the production of safe and high-quality material should be considered.

Support further work (a) on the nature and mode of action of the physiologically toxic factors in legumes and pulses on laboratory animals and man, and (b) on techniques for elimination of these factors. Before adopting any proposed methods of reducing the physiologically deleterious factors, it is necessary (a) that biological testing of the final product be carried out as recommended by PAG, and (b) that detailed study of the economics of the process be made.

Give much more attention to microbiological problems in developing wet processes for industrial production of protein foods and concentrates. This applies to the choice and handling of raw materials, to the design and hygienic maintenance of equipment and to the treatment and protection of the final product to ensure safety for human consumption.

5. New sources of proteins :

Encourage and support long-term research on single-cell protein produced from petroleum or other non-agricultural energy sources. Recent developments indicate that hydrocarbons in petroleum or natural gas can serve as the basis for growing cells from which edible protein could be obtained.

Support research on leaf protein concentrates so as to improve present technology or develop new and superior technologies for its production. The quality of the leaf protein product needs improvement and the feasibility of industrial and village-level production of leaf protein requires study. However, the possibility of producing protein-rich concentrates from green leaves, especially those which are by-products of common crops and those which are cover crops, merits continuing investigation.

6. Production and marketing of new protein foods :

Develop, produce industrially and market in every developing country a variety of reasonably priced, safe and palatable protein foods of high quality suitable for various uses. These can be economically feasible and worth while even where they reach only a small proportion of the vulnerable groups to begin with.

Encourage and support the development and large-scale production of processed foods for infants and pre-school children based on vegetable protein concentrates. International, bilateral and national agencies should give all possible assistance.

Encourage the development and commercial exploitation of high temperature-short time cooking processes in the production of precooked protein foods. High temperature-short time processing minimises damage to protein and other essential nutrients, preserves desired functional properties, avoids the off-flavours typical of prolonged cooking and offers many alternatives in formulation, form, flavour and texture.

Ensure that the development of all protein food products be preceded by a thorough study of their potential market to determine what kinds of protein foods the target consumer is willing and able to purchase. It is stressed that consumers will not necessarily purchase what is nutritionally good for them. The marketing survey should include the evaluation of such factors as acceptability, probable home use, desirable size and type of packaging, pure flexibility, shelf-life and competition with similar existing or potential products.

Establish proper continuing communication between representatives of industry on the one hand and scientists and technologists on the other from the very beginning of the projects to develop and market protein foods. This will help ensure that the benefits may reach the consumer with the least possible delay.

Governments should review and improve their policies, their legislation and regulations, and remove whatsoever abstacles arise as regards processing and marketing of protein food. The industrial production of valuable protein foods in developing countries should not be inhibited by outdated or unnecessary governmental restrictions.

Governments should review their financial and industrial

(*Continued on next page*)

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licensing policies to facilitate the development of a technologically competent protein food industry.

Governments should: (a) Facilitate the provision of good quality raw materials, including cereals, legumes, oilseeds and packaging materials, at reasonable prices.

(b) Provide tax relief for raw materials used in the manufacture of high-protein foods and also the finished products.

(c) Assure adequate public transport at favourable rates.

(d) Purchase a portion of the production of new protein foods for distribution through welfare agencies for a total period of two to three years.

(e) Provide promotional assistance through educational channels of the appropriate government agencies by the distribution of nutrition education material, the use of mass media and demonstrations of the use of such products.

7. Nutrition education of the public :

Strengthen nutrition programmes to utilise through health, education and welfare agencies various types of processed protein foods in addition to conventional foods. These programmes should be concerned mainly with the protection of vulnerable population groups.

Greatly expand nutrition education programmes for lower-income groups. These programmes should emphasise both the improved utilisation of conventional protein foods and the use of low-cost protein concentrates which can be made available to them through industrial processing of less conventional sources.

Support training of personnel in the fields of marketing (including distribution and promotion), market research (*including survey of consumers*) *and systems analysis to assist the marketing and promotion of new protein foods.*

8. Research and training in food technology and nutrition :

Develop and support national and regional centres for research and training in agricultural technology, food science, food technology (including food engineering) and nutrition. With international or bilateral assistance, some national centres could well serve a wider regional function.

Provide adequate support for national and international centres for the animal and clinical evaluation of the protein quality of new protein foods. Protein sources and protein foods resulting from new processing techniques must be thoroughly tested before they can be recommended for use in human feeding. For this the PAG guidelines will be useful.

FAO, WHO and UNICEF directly and through their Protein Advisory Group (PAG) should take concrete steps to facilitate an increase in the exchange of scientific information and experience helpful in evolving new protein foods and concentrates. The current activities of the PAG have been useful in the development of protein foods. The progress in this field requires an intensification of the exchange of information.

Expand the training of personnel in food science and technology, including engineering, and in nutrition and other fields important to the development, production and use of protein foods. More fellowships are required for persons who need to have this training outside their own countries.

Personalia

Mr. D. C. Kothari has been elected the first President of the South Indian Sugar Technologists' Association which was inaugurated in Madras on July 8.

The new association, modelled on the Deccan Sugar Technologists' Association, will serve the sugar industry in the four Southern States of Madras, Andhra Pradesh, Mysore and Kerala.

Mr. Tribhuvandas Patel, President of the Gujarat Pradesh Congress Committee, has been unanimously re-elected Chairman of the Kaira District Co-operative Milk Producers' Union for the year 1967-68. Mr. Ramanbhai Shankarbhai has been elected Vice-Chairman.

Mr. Rajkumar Baliram and Mrs. Shielun Baliram from Nagpur, who have been asarded the Doctor of Philosophy degrees in plan pathology of Iowa State University, are the first husband-and-wife team to earn doctorates in the same field of biological science at Iowa State.

Mrs. Baliram did her doctoral research on sugar beet spot disease, which reduces beet sugar yield. She is believed to be the first researcher reporting on the direct mode of fungus penetration of the host plant. Mr. Baliram's research on pink root disease in onions and other vegetable crops developed new knowledge of the interaction of environmental effects on the fungus and the host plants.

The Balirams, who are at present on leave from the staff of Hislop College, Nagpur, are expected to return to their teaching posts.

Dr. V. Kurien, Chairman of the National Dairy Development Board and General Manager of Amul Dairy, has returned to India after attending an international conference in Rome at the invitation of the United Nations Food and Agriculture Organisation. Dr. Kurien, who participated in the conference as an international dairy consultant, also visited Denmark. At an informal talk in Copenhagen, Danish Government officials offered financial aid worth one million croners (Rs. 10 lakhs) to the NDDB for setting up a dairy development centre at Anand, in Gujarat.

Mr. H. D. Shouri, Director-General of the Indian Institute of Foreign Trade, who is also the first Chairman of the Indian Institute of Packaging, Bombay, has been elected the senior Vice-Chairman of the Asian Packaging Federation. Mr. T. Fukushima of the Japan Packaging Institute, is the Chairman of the Federation.

WHAT OTHERS SAY.....

THE appearance of The Food Industries Journal has been hailed by leading newspapers in the country as a welcome newcomer in the field of industrial journalism in India.

Here are extracts from a few of the notices :

THE TIMES OF INDIA: "A welcome addition to the field of trade publications . . . . assisted by an impressive board of honorary advisers and professing an independent line, it is the publisher's aim to make the Journal a clearing house of information relating to all aspects of the food and allied industries....."

THE SUNDAY STANDARD : "This is a welcome addition in the field of industrial journalism. This independent monthly aims to provide a platform to scientists, technologists, manufacturers, the Government and others concerned with all manner of food industries in the country....."

THE HINDU : "Modern agriculture also involves scientific processing of food, particularly of produce which is harvested in surplus seasonally. For those who are interested in diverse modern methods of preservation and processing of food either for inland consumption or export purposes, the newly started technical monthly periodical, The Food Industries Journal, will be of great use ; . . . "

THE ECONOMIC TIMES : "To the growing number of specialised journals, one more is now added. The Food Industries Journal, which has now made its debut, will, among others, cover industries like vanaspati, sugar, canning, fisheries, baby foods, confectionery, dairying and poultry farming.....

"With the promise of extending its coverage in the months to come, the journal, which is attractively got up, seems to have made a good beginning."

THE FINANCIAL EXPRESS : In a lengthy review of the inaugural issue of The Food Industries Journal, the Financial Express had a special word of praise for several articles.

Among other things, it said: "What has prevented India from gaining a firm foothold in the overseas markets for its processed foods? While discussing this problem in an article . . . Mr. K. C. Nair points out that poor and unattractive packaging, high cost of production and unhealthy competition among our exporters are some of the hurdles in the way of increased exports of our processed foods."

ADMARS: "The inuagural issue of this useful journal . . . . contains articles, reports and features on a variety of subjects dealing with manufacturing, processing, preservation and marketing of food products."

MECHANICAL DATA

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Printed Page Size	.. ..	17.5 cms. x 22.5 cms.
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Inside Back Cover	375	395	410
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Quarter Page	100	105	110

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